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ABSTRACT

This paper reports a study of committee decision processes. Two established university committees, one established departmental committee, and four student ad hoc committees were investigated. Sixteen meetings were videotaped, transcribed, coded, and analyzed. A general systems model was used to conceptualize the decision process and the stochastic theory of Markov chains was used to operationalize the concept of decision making. Five research questions were posed and thirty-five major hypotheses were tested to provide answers. The questions concerned the stability of the transition probabilities from various speaker-mode states and communicative function states during the decision processes. Results indicated that in committees with a majority of faculty members, students initiated the fewest proposals of all members. But in the student ad hoc committees, more proposals were initiated than in the established committees with faculty membership and a faculty chairperson. (Author)

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Final Report

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THE ANALYSIS OF DECISION-MAKING IN SMALL GROUPS

October 1973

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Office of Education

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Author's Abstract

This paper reports a study of committee decisioning processes. Two established university committees, one established departmental committee, and four student ad hoc committees were investigated. Sixteen meetings were videotaped, transcribed, coded, and analyzed. A general systems model was used to conceptualize the decisioning process and the stochastic theory of Markov chains was used to operationalize the concept of decisioning. Five research questions were posed and thirty-five major hypotheses were tested to provide answers. The questions concerned the stability of the transition probabilities from various speaker-mode states and communicative function states during the decisioning processes. The questions also concerned the frequencies and sources of proposals initiated during the processes. Results indicated that in committees with a majority of faculty members, students initiated the fewest proposals of all members. But in the student ad hoc committees, more proposals were initiated than in the established committees with faculty membership and a faculty chairperson.

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Background for the Study

Most decision-making research has resulted in the development of either formal or empirical theories of decision-making behavior. Formal theories come from micro-economics (e.g., von Newman & Morgenstern, 1947; Bross, 1953; and, Edwards & Tversky, 1967), mathematics (e.g., Luce & Raiffa, 1957; and, Chernoff & Moses, 1959), operations research (e.g., Churchman, Ackoff & Arnoff, 1957), and marketing (e.g., Cundiff & Still, 1964).

Formal theories of decision-making rest on four axiomatic underpinnings. First, decision-making is conceived as making choices among a set of alternatives and the individual choice-makers are assumed to be rational and economically motivated. Second, the choice-maker is assumed to know all possible choice alternatives at the outset of the decision-making task. Third, it is assumed that the individual has rules for rank ordering his preferences for the alternatives. Finally, the choice-maker is assumed to have access to all relevant information at the outset. The focus is on individual choice-making behavior inasmuch as objective and subjective utilities and utility indices must be computed on individuals and not on groups. The research strategy is experimental and the products are equations, frequently mathematical equations, representing individual choice-making behavior.

Empirical theories of decision-making come predominantly from the social and behavioral sciences (e.g., Lazarsfeld, Berelson & Gaudet, 1944; Katz & Lazarsfeld, 1955; Likert, 1961; Rogers, 1962; Clark, 1968; Rogers & Shoemaker, 1971; and Vroom & Yetton, 1971). Such theories focus on the social-psychological rather than economic-rational parameters of decision-making and concern multi-person rather than individual behavior.

The major assumption directing the empirical investigation of decision-making is that input and intervening conditions influence the decision outcome. These influencing conditions include leadership style (e.g., Fiedler, 1967), task and social-emotional roles (e.g., Bales & Slater, 1955; Bates & Cloyd, 1956; Cloyd, 1964; and, Burke, 1967), social position and the status of group members (e.g., Fleming, 1973), quality and quantity of the information available to group members (e.g., Cangelosi, Robinson & Schkade, 1968; Alkire, Collum, Kaswan & Love, 1968; and, Poral & Haas, 1969), the power of various group members (e.g., Butler, 1965; Barber, 1966; and, Miller & Butler, 1969), the degree of member participation (e.g., Wood, 1971; 1972), the type of task on which the group works (e.g., Roby & Lanzetta, 1958), the degree of member conformity and consensus (e.g., Allen & Levine, 1969), and the length of time the individuals have worked as a group (e.g., Hall & Williams, 1966). The dependent measures of the effects of these variables usually are the speed with which final decisions are arrived at as well as their quality and quantity. This research strategy has provided a wide range of structural-functional theories of group decision-making.

Neither the formal nor the empirical research traditions have been concerned with constructing theories that account for the dynamics of the decision-making process per se. Formal theories explain how an individual will choose among a set of alternatives given certain initial assumptions. Empirical theories explain how certain initial conditions influence the shape of the final decision product. Both model decision-

making as a static phenomenon. Neither has attempted to explain the process by which decisions are arrived at. They are concerned with input to and output from the process but not with the process itself. Although Bales' initial work (1950), as well as some of his subsequent research (e.g., 1955), are analyses of group interaction processes, his concern has been with behavior clusters defining member roles in groups and not on behavioral patterns characteristic of the decisioning process per se.

A definite need exists for a model that complements our present understanding of the static properties of decision-making. Such a model should represent decisioning processes in which all alternatives are not known in advance, only incomplete information is available on the topic of discussion, and the decision is a creation of the group rather than a selection of one of several options existing a priori.

Decisioning processes of groups can be conceived of as multi-dimensional behavior systems. The model to be outlined is concerned with two dimensions; the speaker-mode dimension and the function dimension. The speaker-mode dimension identifies the role of the speaker and his mode of communication; the function dimension identifies the functions of the communication modes. The decisioning-making groups modeled in this study are academic and student committees having an agenda consisting of several items or topics to be discussed and decided. Agendas provide the broad boundaries for the decisioning processes. The agendas specify the topics to which the groups should address themselves but not the specific proposals to be discussed.

Verbal behavior is treated as the mechanism by which groups arrive at decisions. As Scheidel (1964) and Fisher (1970) argue, small group decision-making is similar to a "method of residues." A group generates a number of ideas or suggestions for a given topic. These ideas and suggestions are treated as decision proposals and evaluated. Some are eliminated and some are modified and retained. Of those ideas retained, some are eventually combined with other ideas and become part of the decision package which emerges as other alternatives are eliminated. What is left after the evaluation process is the residue of the discussion--the emergent decision. Verbal behavior is the mechanism by which decision proposals are introduced, focused, evaluated, rejected, and combined.

To arrive at a decision, groups generate, evaluate, and retain ideas. Usually an agenda will specify the topic but not the proposals considered. Consequently, much of the idea generation relates to the decision proposals for any given topic. Group members will offer opinions and provide suggestions for consensus. At this stage there are no explicit guidelines for evaluating these ideas. The development of evaluative criteria is a retrospective process, for the most part. The agenda does not provide criteria, in operationalized form, by which the recommendations or proposals should be judged. Hence, as the group members provide more proposals, the nature of the topic becomes more fleshed out. As various evaluative criteria are introduced, group members get a more complete picture of the topic and its implications. As a more complete cognitive picture emerges, so do more specific criteria by which ideas should be assessed. Eventually, the evaluative criteria become transformed from implicit to explicit in the form of substantiations or reasons for agreement or disagreement. During the early part of a decisioning process, any one member has relatively little idea of the implications of each proposal. But as the process procedes, the details become clearer and so do the reasons for accepting, modifying, or rejecting the proposals.

This report formulates a probabilistic-dynamic model of group decisioning and describes a study based on that model. The term decisioning refers to the process which generates, evaluates, and selects a course of action. The focus of the model is on the unfolding of behaviors over time rather than on a final, and sometimes arbitrarily identified, decision or choice.

The model of group decisioning assumes that the process is bounded by five parameters: the information environment in which the group operates; the source of evaluation of the group's work; the power of the group to take action on its own decisions; the nature of the task on which the group works; and the decision rule which designates what constitutes a decision.

The information environment in which decisioning occurs can be complementary, overlapping, or symmetrical. In a complementary environment, each group member has access to information which none of the others have. In an overlapping environment, all group members share some of the same information but each member has some information which none of the others have. In a symmetrical information environment, all members have access to the same information.

The three types of information environments represent different points on a continuum. As the environment becomes less complementary, the lower the initial potential of what Collins and Guetzkow (1964) call an "assembly effect," less time is needed for information exchange, and more time is devoted in the decisioning process to generating and evaluating information. The trade-off is one of reliance on information exchange versus reliance on the decisioning process to generate information.

The source of evaluation can be external to or reside within the group. This parameter refers to who judges or evaluates the decisioning process and its outcomes.

Decisioning groups also vary in terms of the power with which they are invested. Some groups have the power to implement or act directly upon the outcome of their decisioning. Other groups can recommend their decisioning product to another group. Power and source of evaluation are closely linked conceptually. The more power a group has, the more internal its source of evaluation. The less the group's power, the more external the source of evaluation.

Closely related to the first three parameters is a fourth, the task of the group. Problem-solving tasks are problems having an externally verifiable correct solution. Discussion tasks have no right or wrong answer. The task involves considering a problem for which there is no pre-existing correct solution. The group creates its own criteria for evaluating the product of their decisioning process during the course of the process itself.

Decisioning operates in accordance with one of two decision rules. They reach consensus by either majority decision or unanimous decision rules. The model explicated in the following section pertains to committees bounded by any combination of these five parameters. It was designed to provide answers to the following research questions.

1. To what extent is the pattern of speaker-mode states stable both across committee meetings and across time intervals of those meetings?
2. To what extent is the pattern of speaker-mode states stable across committee meetings only?

3. To what extent is the pat:ern of communication function states stable both across committee meetings and across time intervals of those meetings?
4. To what extent is the pattern of communication function states stable across committee meetings only?
5. Do the different types of committees differ in terms of the sources and frequencies of proposals input to the decisioning processes?

General Procedures

Properties of the Decisioning Model

For the purposes of this study the decisioning process of committees is modeled as a behavioral system. Components of the system are committee members and communication is the mechanism interrelating the components over time. Verbal behaviors are the inputs that drive the decisioning process and maintain the system's identity. Some inputs function as decision proposals and others function to process the proposals into final decision products.

Symbolically, decisioning processes are defined as systems with the following properties;

$$Y = \{C, I, S, T, P\}.$$

C is a set of three or more components. I is a non-empty set of inputs that determine state definition. S is a non-empty set of system states. States describe possible configurations systems may possess or map themselves into. System states S represent all possible modes of system behavior. T is a set of time values indicating in what time frame a system is operating. Given different time-frames, different inputs become salient. P is a function of I and T. P_{ij} operates on an initial state S_i defined by input I_i at a given time T_1 to produce a new state S_j of the system Y at time T_2. Inasmuch as P_{ij} is the probabilistic rule specifying the state S_j at time T_2, given the state S_i at time T_1, P is of prime importance in describing the state changes of a system Y over time. It allows for the prediction of new states, or a probability distribution of states over time.

Operationalizing Model Properties

Y. Data were collected on the decisioning processes of seven groups. Two groups were established university committees, one was an established departmental committee, and four groups were ad hoc student committees. Each group was contact prior to the initiation of the study to secure cooperation. The groups held their regularly scheduled meetings in the main conference room of the Behavioral Sciences Laboratory of the Ohio State University. The conference room was carpeted, panelled, equipped with conference tables and chairs, contained a portable chalk board, and was wired for videotaping. Both of the established university committees had two meetings videotaped in the conference room. The established departmental committee had three meeting videotaped. Three meetings of one ad hoc student committee and two meetings of the remaining three ad hoc student committees were videotaped. (For logistic details see Appendix A).

Each meeting was treated as a separate decisioning process. All committees worked within overlapping information environments, all had external sources of evaluation, all had the power to recommend but not to implement, all were confronted with discussion tasks, and all adhered to the majority decision rule.

C. The two established university committees were comprised of a majority of faculty members and a minority of student members. The chairpersons of these two committees were faculty members. The established departmental committee consisted of all student members except one faculty member who was the chairperson. The four ad hoc student committees were comprised entirely of students. Figure 1 identifies the seven committees by their constituency, history, type of members, number of meetings, and chairperson.

I. Committee members were modeled as information processors. Inputs to the decisioning process were defined as verbal behaviors of the committee members. Each input was coded for both speaker-mode and function. Each meeting was videotaped and transcribed. The transcripts were the permanent records of the inputs. Transcripts were checked against the videotapes for accuracy.

S. States of the decisioning systems were defined operationally as categories into which verbal inputs were classified. The meetings of the two established university committees and the established departmental committee were coded on both the speaker-mode and function dimensions. The three speaker states were student, faculty, or chairperson; th modes were assert, request, or propose, resulting in nine possibl speaker-mode states. Meetings of the four student ad hoc committees were not coded on the speaker-mode dimension because all members were students and there were no appointed chairpersons.

The meetings of all seven committees were coded according to the function of each verbal input. Each input could function in one of ten ways, irrespective of the source or mode of those inputs. A verbal input could function as a proposal, which provided a new topic or recommendation for discussion, or reintroduced a previously discussed proposal. An input functioned as a request when it inquired after information or explicitly sought a response. The decisioning process was coded as being in a favor state when a verbal input favored or advocated the proposal being discussed. It should be noted that all function states were coded with respect to the most recently initiated proposal. Consequently, a request input requested more information about the proposal under discussion and a favor input favored the proposal under discussion, etc. A disfavor input was a statement that disfavored or advocated the rejection of the proposal being discussed. The decisioning process was said to be in an ambiguous state as the result of an incomplete statement or a statement which expressed both favorable and unfavorable opinions about the proposal being input to the process. When verbal inputs provided additional information about the proposal, or restated the proposal thus focusing it, the input was coded as a clarification. Decisioning processes were in an agreement state when a verbal input agreed with the immediately preceding input and not the proposal under discussion. Statements disagreeing with the immediately preceding statement and not the focal proposal defined a disagreement state. The process was in a state of modification when statements were uttered that made a substantive change in the proposal being discussed. When the decisioning system was in a state of modification it was highly probable that it would map into a new decision proposal. The decisioning system was said to be in the etcetera state whenever an unintelligible or indecipherable statement was input to the process.

COMMITTEE	CONSTITUENCY	HISTORY	# OF FACULTY	# OF STUDENTS	# OF MEETINGS	CHAIRPERSON
#1	University	Established	8	4	2	Faculty
#2	University	Established	9	5	2	Faculty
#3	Department	Established	1	8	3	Faculty
#4	Student Body	Ad Hoc	0	5	3	Student
#5	Student Body	Ad Hoc	0	5	2	Student
#6	Student Body	Ad Hoc	0	6	2	Student
#7	Student Body	Ad Hoc	0	6	2	Student

Figure 1. The sixteen decisioning processes identified according to the seven committees used in the study, their constituencies, histories, numbers of faculty and student members, and status of their chairpersons.

T. The time-frame of the decisioning systems was the average length of a committee member's single uninterrupted single-function statement. The time-frame of the decisioning systems was a direct function of the inputs processing the proposals.

P. This was the probability that the decisioning system would be in state S_j at time T_2, given that the system was in state S_i at time T_1. Inasmuch as this model of decisioning is a probabilistic-dynamic one which accounts for change over time, the stochastic theory of Markov chains was used to operationalize P.

A Markov chain consists of a state probability vector V, and a transition probability matrix M (Kemeny & Snell, 1960). Any state probability V_s in the vector V is the probability that the system will be in a given state S_i at time T_1. The probability that the system will map itself from state S_i at time T_1 into state S_j at time T_2 is represented as M_{ij}. All the possible state transitions of a system .m a two-dimensional matrix;

$$M = \begin{matrix} m_{11} & m_{12} & m_{13} & \cdots & m_{1n} \\ m_{21} & m_{22} & m_{23} & \cdots & m_{2n} \\ m_{31} & m_{32} & m_{33} & \cdots & m_{3n} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ m_{n1} & m_{n2} & m_{n3} & \cdots & m_{nn} \end{matrix}.$$

The transition probability matrix M, represented above, contains the probabilities of each one-step transition of the system Y. The rows of the transition probability matrix M represent the time T_1 state of the system Y and the columns represent the time T_2 state. Each matrix cell--defined by an intersecting row and column--represents a one-stpe transition of the decisioning system.

Inasmuch as there are eight functional states decisioning systems can occupy at any given time, there are sixty-four possible one-step transitions for the process; it can remain in state S_j at time T_2, given

that it occupied state S_j at time T_1, or it can map itself into seven other states from time T_1 to T_2. Consequently, transition probability matrices M for decisioning systems allow for the tracking of system state transitions for indefinitely long series of transitions. By identifying a state S_i at time T_1, we tracked the most likely sequence of state transitions to follow it. We diagrammed the tracking of several probable states at each transition point and developed graphs of the decisioning processes.

Methods of Data Analysis

Coding Reliability. Two indices of transcript coding reliability were used. Unitizing reliability reflects the consistency with which coders selected the same amount of verbal behavior to be classified in each category. Categorizing reliability reflects the proportion of units of verbal behavior the coders classified similarly.

Coders can make two types of errors in unitizing transcripts of verbal behavior. First, they may break the transcript into classifiable units at different places so that the total number of units coded by two people in equal but the units are not coterminous. Second, two coders may classify a given segment of the transcript into different numbers of units. In this study, unit coterminability was ensured by dividing the transcripts into units of uninterrupted utterances. The coding procedure was to classify each uninterrupted utterance as a decision proposal or as one of the eight function categories. But it was possible to classify a single uninterrupted utterance into more than one functional category; one utterance may perform more than one function on the decision proposal. Consequently, an estimate of the second type of unitizing error was necessary. Comparing the number of units classified by two coders constituted a basis for determining unitizing reliability.

Obtained values of unitizing reliability were determined by expressing the difference between two coders as a percentage of the sume of the numbers of units obtained by each coder. Using these obtained values of unitizing reliability, Guetzkow's (1950) formula was used to obtain estimates of coder unitizing reliability (see Appendix B for details regarding the computation of reliability estimates). Obtained values of unitizing reliability ranged from .05 to .12 when two coders unitized three segments of transcripts, each segment consisting of approximately one hundred units of verbal behavior. The most conservative obtained value--.12--can be expected only one time in one hundred when the coefficient of variation for two coders is .03. This estimate of unitizing reliability was considered quite satisfactory.

The obtained values of categorizing reliability for two coders were computed by summing the items they classified correctly and those items classified incorrectly in the same incorrect way and dividing by the total number of units coded. These obtained proportions of agreement (P') were then used as single estimators in Guetzkow's (1950) procedure for determining the theoretical proportion of agreement (P) (for details see Appendix C).

In this study, five obtained values of categorizing reliability--ranging from .80 to .88--were used as estimators. The most conservative P' produced expected limits of the theoretical proportion of categorizing reliability between two coders of .78 ± .13, or .65 to .91 which was considered satisfactory.

Analysis of the Decisioning Processes. Three computer programs were written to analyze the decisioning processes of the seven committees. The first program consisted of five subroutines and analyzed the state probability vectors V and the transition probability matrices M of the sixteen decisioning processes. Subroutine 1a printed out the observed probabilities of each of the eight functional states occupied during each decisioning process; the entropy value of each state; the relative entropy value for each state; the observed frequency of each state being occupied during the processes; and, the equilibrial proportion of each decisioning process.

The entropy value of each state was calculated for each row of each transition probability matrix M. The relative entropy value was the ratio of each state entropy value to the maximum entropy value. Maximum entropy was the entropy value each state would have if all states were occupied an equal proportion of the time. Equilibrial proportions were the probabilities of each state if the decisioning system were to maintain its observed transition probabilities for an indefinitely long period of time (Ashby, 1958, pp.16ff). These proportions were calculated by multiplying the matrix M by itself until it stabilized (Kemeny & Snell, 1960, p.33). This section of subroutine 1a was a simulation of the process; it operated over time as if the decisioning process was continuing.

Subroutine 1b printed out the transition probability matrix M of each decisioning process. The matrix followed the arrangement used by Kemeny and Snell (1960) with matrix rows representing the first state (T_1) and matrix columns representing the following state (T_2). Both transition frequencies and probabilities were printed out.

Subroutine 1c printed out the probable transition matrix M' of each decisioning process. These matrices included only transition probabilities larger than a criterion value. The criterion value for this study was any probability greater than equi-probability. These matrices were more compact than the complete transition matrices M because they included only transitions occurring more frequently than would be expected at a chance level.

Subroutine 1d printed out the overall entropy measures of the transition probability matrices M and M'. The maximum entropy measure was the entropy value that would be found if all states were equi-probable (Ashby, 1958, p.175). In addition, Attneave's (1959, pp.46ff) four information measures were provided. H(X) was the measure of the estimated information per T_1 state and was calculated by rows of the transition probability matrix M. H(Y) was the measure of the estimated information per T_2 state and was calculated by columns of the matrix M. H(X,Y)

measured the estimated information per joint occurrence of T_1 state and T_2 state which was calculated by cells of the matrix M. Finally, H(X;Y) measured the estimated information transmitted from T_1 state to T_2 state and was computed by summing H(X) and H(Y) and subtracting that quantity from H(X,Y).

Subroutine le divided any single decisioning process into a variable number of sub-processes which could then be analyzed individually. These data were helpful in providing a more finely textured analysis of the change occurring over time within any given decisioning process. Transition probability matrices M, and the statistics provided by the five subroutines, were printed out for each sub-process.

A second program was written to calculate the Neyman-Pearson statistic for each decisioning process. This statistic indicated the similarity of a "sample" transition frequency matrix to a "master" transition frequency matrix (Jaffe & Feldstein, 1970, pp.134-136). The Neyman-Pearson statistic has a chi-square distribution with df = N(N-1), where N is the number of rows or columns of the matrices being compared.

The master matrix was the overall transition probability matrix M for a single decisioning process; the sample matrices were portions of that decisioning process. Each decisioning process was divided into four equal time units, a matrix was printed out for each fourth of the entire process, then each of these matrices was compared to the master. In this manner, the Neyman-Pearson statistic determined which of a number of sample matrices was most similar to the entire process. Values of the statistic close to zero indicated similar matrices; the statistic was zero when the sample and master matrices were equivalent.

A third program was written to compare in tact individual decisioning processes to a composite matrix comprised of several in tact decisioning processes (Anderson & Goodman, 1957). Each meeting of a committee was compared with a composite matrix comprised of all the meetings of that committee. This was to determine the similarities of different decisioning processes of the same committee. The program consisted of a series of likelihood statistics which tested the hypotheses that the transitions from each state were not significantly different in the individual decisioning processes than they were in the composite of all processes. An overall likelihood statistic was printed out which tested the hypothesis that all state transitions from all matrices were not significantly different from all state transitions in the composite matrix.

Results

Research Question #1. To what extent is the pattern of speaker-mode states stable both across committee meetings and across time intervals of those meetings?

To answer this question, four hypotheses were tested. Each meeting of the established committees was divided into four equal intervals and a speaker-mode transition probability matrix was constructed for each one-quarter interval of each meeting. In addition, a composite speaker-mode transition probability matrix was constructed for each of the three established committees. Anderson and Goodman's (1957) likelihood statistic was used to test the degree of similarity among the transition probabilities of each matrix and the composite matrix (see Appendix D). All transition probabilities in each one-quartermeeting matrix, plus the transition probabilities of the composite matrix, were compared for degree of similarity. These four hypotheses tested the stability of transition probabilities from speaker-mode states across both meetings and time intervals.

H_1: The transition probabilities from all speaker-mode states in the one-quarter meeting matrices for meetings #1 and 2 of the first established university committee (hereafter referred to as EUC I) and the composite matrix are the same.

H_1 was not rejected. A X^2 value of 434. 5488, with 504 df, was obtained and the X^2 value needed for rejection at the .01 alpha level was 580.5971. This means that the transition probabilities from all speaker-mode states in all of the one-quarter interval matrices for the two meetings of EUC I and the transition probabilities from all speaker-mode states in the composite matrix were similar at the .01 level of significance.

Hypothesis 2 posits the same relationships among the speaker-mode transition probability matrices for the meetings of the second established university committee (hereafter referred to as EUC II).

H_2: The transition probabilities from all speaker-mode states in the one-quarter meeting matrices for meetings #1 and 2 of EUC II and the composite matrix are the same.

H_2 was not accepted. A X^2 value of 600.5671 ($P < .01$, 504 df) was obtained. As will be the case when any of the major hypotheses cannot be accepted, a sub-hypothesis will be tested to determine which state or states are unstable across meetings and time intervals.

H_{2a}: The transition probabilities from each speaker-mode state in each of the one-quarter interval matrices of meetings #1 and 2 of EUC II are the same as the transition probabilities from each speaker-mode state in the composit matrix.

Inasmuch as H_2 was not accepted, it was no surprise that H_{2a} could not be accepted. H_{2a} was tested to compare each speaker-mode transition probability of each one-quarter meeting matrix to its counterpart transition probability in the composite matrix to determine degree of stability of the transitions from each speaker-mode state. H_{2a} revealed that transition probabilities from all three assertion mode states were unstable across meetings and across time intervals. Transition probabilities from faculty assertions ($X^2 = 205.6467$, $P < .001$, 56 df), student assertions ($X^2 = 78.9615$, $P < .01$, 56 df), and chairperson assertions ($X^2 = 97.1401$,

$P < .001$, 56 df) differred significantly from one time interval to the next, across meetings, when compared to the composite matrix of those two meetings.

Hypothesis 3 combined the one-quarter meeting transition probabiltiy matrices of meetings #1 and 2 of EUC I and meetings #1 and 2 of EUC II and the composite matrix, to determine stability of transitions from speaker-mode states across meetings and time intervals.

> H_3: The transition probabilities from all speaker-mode states in the one-quarter meeting matrices for meetings #1 and 2 of EUC I and meetings #1 and 2 for EUC II and the composite matrix are the same.

H_3 was not rejected. A X^2 value of 1155.8872, with 1080 df, was obtained and a X^2 value of 1190.3004 was needed to accept the null hypothesis at the .01 alpha level. Stated another way, when all the meetings of the two established university committees were sub-divided into fourths and compared with the composite speaker-mode transition probability matrix, no significant differences were found. Transitions from speaker-mode states were similar and stable across time intervals and meetings.

Hypothesis 4 compared the one-quarter meeting matrices of the three established departmental committees (hereafter referred to as EDC I) and the composite matrix.

> H_4: The transition probabilities from all speaker-mode states in the one-quarter meeting matrices for meetings #1, 2, and 3 of EDC I and the composite matrix are the same.

H_4 was not rejected. A X^2 value of 392.6707, with 792 df, was obtained and a value of 887.1820 was needed to reject the null hypothesis at the .01 alpha level. Apparently the transition probabilities from the nine speaker-mode states are similar and stable across meetings and across time intervals.

The answer to the first research question is that the pattern of speaker-mode states across committee meetings and across time intervals is stable in two of the three established committees studied. In one established committee, transitions from the three assertion mode states are unstable across meetings and time intervals. But when combined with the other established university committee for comparison, the instability of transitions from assertion mode states is absorbed.

The second research question ignores the variable of time and simply compares the stability of transition probabilities from speaker-mode states across meetings. The purpose of the second research question was to compare entire decisioning processes without segmenting those processes into smaller intervals in order to identify gross differences in processes.

Research Question #2. To what extent is the pattern of speaker-mode states stable across committee meetings?

To answer this question, four hypotheses were tested. A speaker-mode transition probability matrix was constructed for each of the meetings of the established committees and were compared with the composite transition probability matrix for each of the three committees.

H_5: The transition probabilities from <u>all</u> speaker-mode states in the matrices for meetings #1 and 2 of EUC I and the composite matrix are the same.

H_5 was not accepted. A X^2 of 125.4118 ($P < .001$, 72 df) was obtained. The results of Hypothesis 1 revealed no differences in transition probabilities from speaker-mode states when the meetings of EUC I were divided into four intervals and compared across intervals and meetings. But when the meetings were compared in their entireties, transition probabilities from all speaker-mode states were not the same. A sub-hypothesis was tested to determine which state or states were not stable when compared only across meetings.

H_{5a}: The transition probabilities from each speaker-mode state in each of the matrices for meetings #1 and 2 of EUC I are the same as the transition probabilities from each speaker-mode state in the composite matrix.

H_{5a}, of course, was not accepted. Transition probabilities from three speaker-mode states in the two decisioning processes of EUC I were not statistically similar when compared to their counterpart transition probabilities in the composite matrix. Transition probabilities from faculty assertions ($X^2 = 36.1221$, $P < .001$, 8 df), chairperson assertions ($X^2 = 26.7091$, $P < .001$, 8 df) and faculty proposals ($X^2 = 23.4890$, $P < .005$, 8 df) were not the same in meetings #1 and 2 as in the composite matrix.

Hypothesis 6 tested the stability of transition probabilities across the two meetings of the second established university committee.

H_6: The transition probabilities from all speaker-mode states in the matrices for meetings #1 and 2 of EUC II and the composite matrix are the same.

H_6 was not accepted. A X^2 of 192.8154 ($P < .001$, 72 df) was obtained. Recall the Hypothesis 2 focused on the two meetings of EUC II and compared all transition probabilities across both time intervals and across the two meetings. It was found that transition probabilities from faculty assertions, student assertions, and chairperson assertions were unstable. Hypothesis 6a tested if transition probabilities from these and/or other speaker-mode states were also unstable when compared across meetings only.

H_{6a}: The transition probabilities from each speaker-mode state in the matrices for meetings #1 and 2 of EUC II are the same as the transition probabilities from each speaker-mode state in the composite matrix.

H_{6a}, as expected, was not accepted. But its results revealed the sources of the dissimilarity between the two meetings. Transition probabilities from faculty assertions ($X^2 = 69.0274$, $P < .001$, 8 df). student assertions ($X^2 = 22.2875$, $P < .005$, 8 df), chairperson assertions ($X^2 = 36.9923$, $P < .001$, 8 df), and student proposals ($X^2 = 20.8621$, $P < .01$, 8 df) were not statistically similar when meetings #1 and 2 were compared to their counterpart transition probabilities in the composite matrix. Notice that the three assertion mode states were unstable both when the two meetings were compare across time intervals and meetings and also when the two meeting matrices were compared only across meetings. Transition probabilities from student proposals were found to be unstable when the meeting matrices were compared only across meetings, but they were significant only at the minimum alpha level. It is apparent that, for EUC II, the transition probabilities from the

three assertion modes are unstable both across time intervals andacross meetings. The remaining six speaker-mode states are stable over time and across meetings.

Hypotheses 5a and 6a indicated that when the two meetings of EUC I and the two meetings of EUC II were compared respectively, transition probabilities from the three speaker assertion states were unstable. Hypothesis 7 combined these four meetings of the two established university committees, and their composite matrix, to determine if those instabilities in transition probabilities persisted in a more comprehensive comparison.

H_7: The transition probabilities from <u>all</u> speaker-mode states in the matrices for meetings #1 and 2 of EUC I and meetings #1 and 2 of EUC II and the composite matrix are the same.

H_7 was not accepted. A X^2 of 439.2380 ($P < .001$, 216 df) was obtained. The sub-hypothesis was tested to determine which speaker-mode states were dissimilar, in terms of transition probabilities, across meetings.

H_{7a}: The transition probabilities from <u>each</u> speaker-mode state in the matrices for meetings #1 and 2 of EUC I and meetings #1 and 2 of EUC II are the same as the transition probabilities from each speaker-mode state in the composite matrix.

As predicted, H_{7a} was not accepted. Transition probabilities from the three speaker-mode states that were unstable when the two meetings of EUC I were compared to the composite (Hypothesis 5a) were also found to be unstable when the four meetings of the two established university committees were compared to their composite. Transition probabilities from <u>faculty assertions</u> (X^2 = 135.1487, $P < .001$, 24 df), <u>chairperson assertions</u> (X^2 = 87.8220, $P < .001$, 24 df), and <u>faculty proposals</u> (X^2 = 44.1189, $P < .01$, 24 df) were significantly dissimilar among the four meetings of the two established university committees. Transition probabilities from <u>student assertions</u> and <u>student proposals</u>, which were found to be unstable across the two meetings of EUC II, were not sufficiently unstable to account for differences when all four meetings of the two committees were compared.

Recall that Hypothesis 4 tested the proposition that transition probabilities from all speaker-mode states in the three meetings of EDC I were the same across meetings and time intervals. That proposition was not rejected. Hypothesis 8 tested that same proposition ignoring the across time interval comparisons.

H_8: The transition probabilities from <u>all</u> speaker-mode states in the matrices for meetings #1, 2, and 3 of EDC I and the composite matrix are the same.

H_8 was not rejected. A X^2 of 73.4588, with 144 df, was obtained and the X^2 value needed for significance at alpha level .01 was 185.6164.

The answer to the second research question is that the pattern of speaker-mode states across committee meetings is unstable in the two established university committees and stable in the one established departmental committee. The speaker-mode states responsible for the instabilities across meetings were <u>faculty assertions</u>, <u>chairperson assertions</u>, and <u>faculty proposals</u>.

To provide additional information about the pattern of speaker-mode transition probabilities in the meetings of the three established committees, the nine speaker-mode states were collapsed into three mode states--assert, request, and propose. Profile ratio scores, by one-

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quarter time intervals, were computed for transition frequencies from each of the three mode states for each meeting of EUC I, EUC II, and EDC I. When focusing on communication mode, irrespective of speaker, a 3 x 3 transition matrix is produced; each of the three modes can map into the same mode at time T_2 or into one of the other two mode states. A profile ratio score is simply the ratio of the frequency of each of the possible mode transitions to the total frequency of all nine possible transitions. Nine profile ratio scores were computed for each one-quarter time interval. Since there were four time intervals, thirty-six profile ratio scores were computed for each committee meeting. These scores indicated what proportion of the communicative behaviors in each one-quarter interval were transitions from assertions, requests, and proposals. Tables 1 through 7 display the profile ratio scores for the seven meetings of EUC I, EUC II, and EDC I.

TABLE 1

Speaker-Mode Profile Ratio Scores
by One Quarter Intervals for EUC I Session 1

Speaker-Mode Transitions		Time Intervals 1	2	3	4
Assert	Assert	.81	.61	.61	.60
Assert	Request	.06	.10	.07	.05
Assert	Proposal	.03	.09	.08	.04
Request	Assert	.06	.09	.07	.05
Request	Request	.00	.01	.00	.00
Request	Proposal	.00	.01	.01	.00
Proposal	Assert	.04	.09	.10	.04
Proposal	Request	.00	.00	.01	.00
Proposal	Proposal	.00	.00	.02	.22

TABLE 2

Speaker-Mode Profile Ratio Scores by One Quarter Intervals for [illegible] I Session 2

Speaker-Mode Transitions		Time Intervals 1	2	3	4
Assert	Assert	.59	.70	.69	.58
Assert	Request	.13	.06	.04	.11
Assert	Proposal	.05	.07	.09	.11
Request	Assert	.14	.05	.05	.11
Request	Request	.01	.00	.00	.01
Request	Proposal	.00	.01	.00	.00
Proposal	Assert	.04	.07	.09	.08
Proposal	Request	.01	.01	.00	.02
Proposal	Proposal	.02	.01	.02	.02

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TABLE 3

Speaker-Mode Profile Ratio Scores
by One Quarter Intervals for EUC II Session 1

Speaker-Mode Transitions		Time Intervals 1	2	3	4
Assert	Assert	.67	.91	.93	.95
Assert	Request	.12	.00	.00	.00
Assert	Proposal	.00	.00	.00	.00
Request	Assert	.21	.08	.07	.04
Request	Request	.00	.01	.00	.01
Request	Proposal	.00	.00	.00	.00
Proposal	Assert	.00	.00	.00	.00
Proposal	Request	.00	.00	.00	.00
Proposal	Proposal	.00	.00	.00	.00

TABLE 4

Speaker-Mode Profile Ratio Scores
by One Quarter Intervals for [illegible] II Session 2

Speaker-Mode Transitions		Time Intervals 1	2	3	4
Assert	Assert	.53	.40	.59	.45
Assert	Request	.12	.12	.05	.09
Assert	Proposal	.06	.10	.10	.08
Request	Assert	.14	.10	.06	.08
Request	Request	.06	.01	.01	.01
Request	Proposal	.01	.03	.01	.01
Proposal	Assert	.05	.12	.09	.09
Proposal	Request	.03	.01	.02	.00
Proposal	Proposal	.02	.12	.03	.13

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TABLE 5

Speaker-Mode Profile Ratio Scores
by One Quarter Intervals for EDC I Session 1

Speaker-Mode Transitions		Time Intervals 1	2	3	4
Assert	Assert	.59	.55	.55	.39
Assert	Request	.07	.05	.05	.14
Assert	Proposal	.10	.16	.11	.10
Request	Assert	.10	.06	.07	.16
Request	Request	.04	.00	.04	.01
Request	Proposal	.00	.00	.00	.01
Proposal	Assert	.03	.14	.09	.03
Proposal	Request	.01	.01	.02	.03
Proposal	Proposal	.02	.02	.05	.06

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TABLE 6

Speaker-Mode Profile Ratio Scores
by One Quarter Intervals for EDC I Session 2

Speaker-Mode Transitions		Time Intervals 1	2	3	4
Assert	Assert	.49	.61	.81	.54
Assert	Request	.15	.06	.03	.18
Assert	Proposal	.06	.11	.05	.06
Request	Assert	.13	.05	.03	.19
Request	Request	.03	.00	.00	.00
Request	Proposal	.00	.00	.01	.00
Proposal	Assert	.03	.10	.06	.03
Proposal	Request	.03	.01	.00	.01
Proposal	Proposal	.01	.03	.00	.01

TABLE 7

Speaker-Mode Profile Ratio Scores
by One Quarter Intervals for EDC I Session 3

Speaker-Mode Transitions		Time Intervals 1	2	3	4
Assert	Assert	.57	.58	.43	.68
Assert	Request	.08	.12	.03	.15
Assert	Proposal	.12	.06	.15	.02
Request	Assert	.14	.15	.09	.17
Request	Request	.02	.03	.02	.02
Request	Proposal	.00	.00	.00	.00
Proposal	Assert	.08	.02	.15	.02
Proposal	Request	.08	.02	.02	.00
Proposal	Proposal	.00	.00	.08	.00

A pattern apparent from the profile ratio scores is that almost half of the mode transitions in any time interval of any of the meetings of the established committees were from assertions to assertions. The proportional distribution of assertion-to-assertion transitions varied from meeting to meeting. Table 1 shows that the percentage of assert-to-assert transitions was about eighty percent in interval one, then dropped to about sixty percent in interval two and remained at that level. Table 2 reveals an inverted U shaped proportional distribution of assert-to-assert transitions. Table 3 is almost the reciprocal of Table 1; sixty-seven percent of all transitions in interval one were assertions-to-assertions. The percentage increase is drastically upward in interval two--to ninety-one percent--and the percentage of assert-to-assert transitions remained at that level throughout the meeting.

Table 4 shows that the proportion of assert-to-assert transitions fluctuated from interval to interval. Table 5 indicates that in meeting #1 of EDC I the proportion of assert-to-assert transitions dipped slightly from interval one to interval two, remained constant through interval three, then dropped significantly during interval four. Table 6 shows assert-to-assert transitions to increase from intervals one thorugh three and drop significantly during the last time interval. In the last meeting of EDC I (Table 7), the percentage of assert-to-assert transitions remained constant for two intervals, dropped in the third, then peaked during the fourth.

It is clear that, regardless of relatively minor proportional fluctuations over time, the most prevalent communicative transitions to occur during the decisioning processes of the established committees is from one assertion input to another. Figure 2 illustrates this point graphically. Relatively little time is spent requesting information in the established committee meetings. About ten percent of the transitions over time were from a request-to-assertion. About the same proportion of the transitions were from assert-to-request.

When proposals were made, which was less freuqent than requesting information, assertions were more likely to follow than were questions about those proposals. Slightly less than ten percent of all transitions in meetings of the established committees were from proposals-to-assertions. Slightly less than four percent of all transitions were from proposals-to-questions.

Research Question #3. To what extent is the pattern of communication function states stable both across committee meetings and across time intervals?

To answer this question, seven major hypotheses were tested. Each meeting of the three established committees and four student ad hoc committees (hereafter referred to as SAHC I-IV) was divided into four equal intervals and a function transition probability matrix was constructed for each one-quarter interval of each meeting. In addition, a composite function transition probability matrix was constructed for each of the seven committees. All transition probabilities in each one-quarter meeting matrix, plus the appropriate composite matrix, were compared for degree of similarity both across meetings and across time intervals.

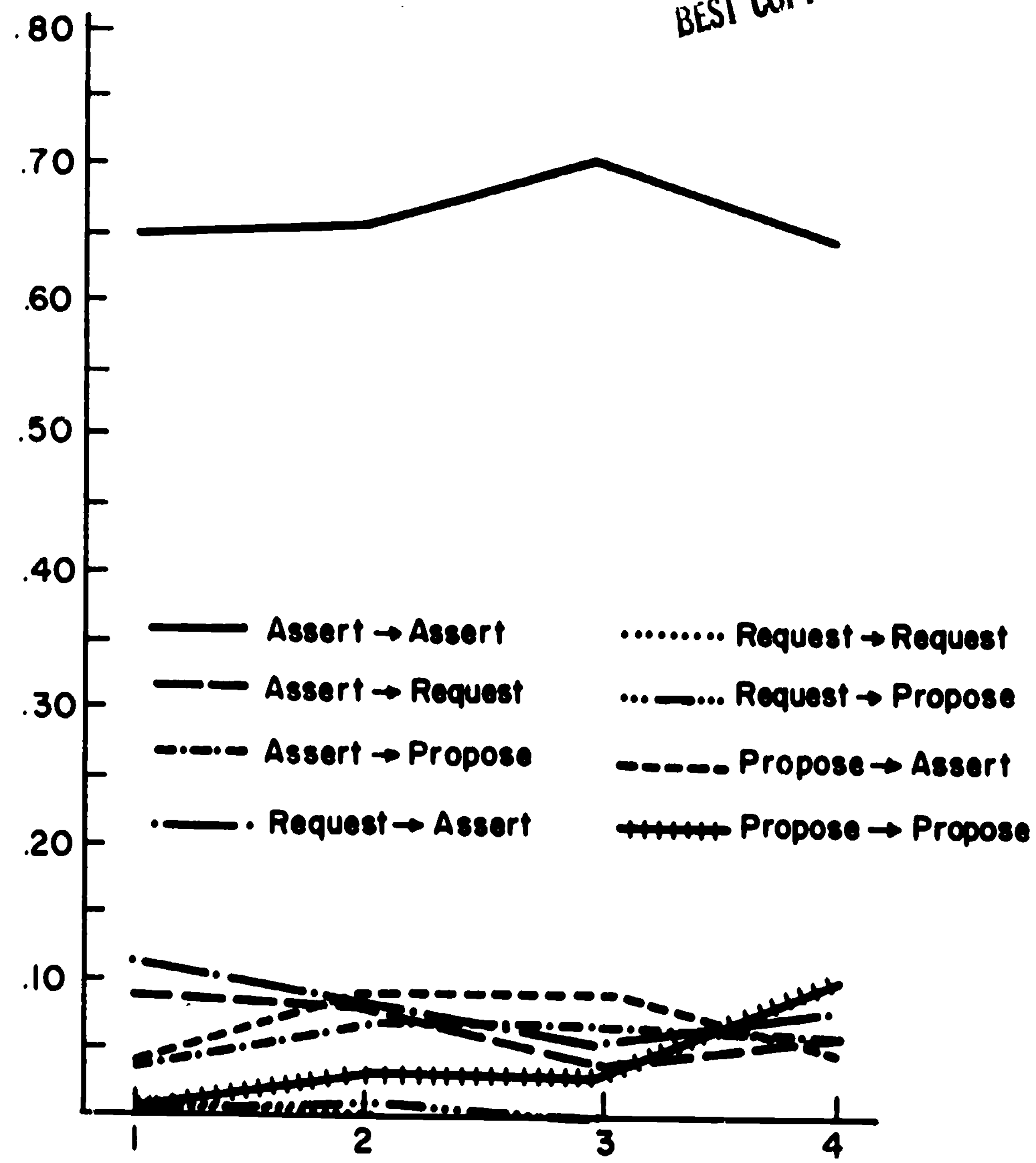

Figure 2. Mean Probable Transitions from One Mode State at T_1 to All Other Possible Mode States at T_2, by One-Quarter Intervals, for EUC's I and II

H_9: The transition probabilities from all function states in the one-quarter meeting matrices for meetings #1 and 2 of EUC I and the composite matrix are the same.

H_9 was not rejected. A X^2 value of 386.0530, with 630 df, was obtained and a X^2 value of 714.7338 was needed to reject the null hypothesis at the .01 alpha level. In short, when the transition probabilities from all ten function states were compared across time and across meetings, for the EUC I committee, no differences were found. The pattern of communication function states, for the first established university committee, was found to be stable across time and meetings.

Hypothesis 10 tested the same proposition with respect to the meetings of the second established university committee.

H_{10}: The transition probabilities from all function states in the one-quarter meeting matrices for meetings #1 and 2 of EUC II and the composite matrix are the same.

H_{10}, like H_9, was not rejected. A X^2 of 550.9001, with 630 df, was obtained but a X^2 value of 714.7338 was necessary to reject the hypothesis of no differences. Along the function dimension of the decisioning processes of the two established university committees, the pattern of transition probabilities compared across meetings and time intervals was stable.

Inasmuch as the transition probabilities from the ten function states were stable across meetings and time intervals in the meetings of the two established university committees, it was unlikely that when the four meetings were combined and the one-quarter meeting matrices compared along with the composite matrix, differences would be found. Nevertheless, that comparison was made.

H_{11}: The transition probabilities from all function states in the one-quarter meeting matrices for meetings #1 and 2 of EUC I and meetings #1 and 2 of EUC II and the composite matrix are the same.

H_{11} was not rejected. A X^2 of 1095.0198, with 1350 df, was obtained but a value for X^2 of 1473.0615 was needed for statistical significance at the .01 alpha level. These data simply support further the proposition that, when compared across time intervals and meetings, the transition probabilities from function states are stable.

Hypothesis 12 tested the stability of transition probabilities from function states across time and meetings of the established departmental committee.

H_{12}: The transition probabilities from all function states in the one-quarter meeting matrices for meetings #1, 2, and 3 of EDC I and the composite matrix are the same.

Like the preceding three hypotheses, H_{12} was not rejected. A X^2 value of 732.9399, with 990 df, was obtained and a value of 1095.6912 was needed to reject the null hypothesis at the .01 level of confidence.

The next five hypotheses tested the stability of transition probabilities from function states across time and meetings of the student ad hoc committees.

H_{13}: The transition probabilities from all function states in the one-quarter meeting matrices for meetings #1, 2, and 3 of SAHC I and the composite matrix are the same.

H_{13} was not rejected. When all the comparisons were made a X^2 value of 495.5483, with 990 df, was obtained and a X^2 of 1095.6912 was needed to reject the hypothesis at the .01 level of confidence.

H_{14}: The transition probabilities from all function states in the one-quarter meeting matrices for meetings #1 and 2 of SAHC II and the composite matrix are the same.

Again, this hypothesis of no differences among the transition probabilities from function states across time and groups was not rejected. A X^2 of 659.1038, with 630 df, was obtained but a value of 714.7338 was needed to reject the hypothesized proposition.

H_{15}: The transition probabilities from all function states in the one-quarter meeting matrices for meetings #1 and 2 of SAHC III and the composite matrix are the same.

Like all the preceding hypotheses tested for research question #3, H_{15} was not rejected. A X^2 of 472.2288, with 630 df, was obtained when a value of 714.2288 was needed for rejection at the .01 alpha level.

H_{16}: The transition probabilities from all function states in the one-quarter meeting matrices for meetings #1 and 2 of SAHC IV and the composite matrix are the same.

Hypothesis 16 was not rejected. a X^2 of 283.4717, with 630 df, was obtained and a value of 714.7338 was necessary for rejection.

Hypothesis 17 compared the one-quarter meeting matrices of all nine meetings of the four SAHC committees to determine stability of transition probabilities from function states across time intervals and meetings.

H_{17}: The transition probabilities from all function states in the one-quarter meeting matrices for meetings #1, 2, and 3 of SAHC I, meetings #1 and 2 of SAHC II, meetings #1 and 2 of SAHC III, and meetings #1 and 2 of SAHC IV and the composite matrix are the same.

Inasmuch as there were no significant dissimilarities uncovered when the meetings of the individual SAHC committees and their composites were compared, it was expected that no dissimilarities would be detected when all the meetings were combined and compared to their composite. This expectation was confirmed and H_{17} was not rejected. A X^2 value of 2579.5215, with 3150 df, was obtained and a value of 3345.0147 was needed for rejection at the .01 alpha level.

The answer to the third research question is that the pattern of communication function states are stable across time intervals for all meetings of the seven committees investigated in this study. Although transition probabilities from assertion mode states were unstable in some instances, the transition probabilities from function states were not dissimilar enough across meetings and time intervals to be considered unstable.

Research Question #4. To what extent is the pattern of communication function states stable across committee meetings only?

It is entirely possible that unstable transition probabilities from function states in a decisioning process, when that process is considered in its entirety, are minimized by being parcelled out into different time intervals when that process is sub-divided into time segments. To determine if this was the case with any of the sixteen meetings of the seven committees studeid, nine additional hypotheses were tested. For these nine hypotheses, transition probability matrices from function states were computed for each meeting and for appropriate composites. These matrices were not sub-divided into fourths but were left in their entirety.

H_{18}: The transition probabilities from <u>all</u> function states in the matrices for meetings #1 and 2 of EUC I and the composite matrix are the same.

H_{18} was not rejected. A X^2 value of 98.5033 was obtained, with 90 df, and the value needed for rejection at the .01 level was 124.1160. It is apparent that the transition probabilities from function states in the meetings of the first established university committee are stable. Hypothesis 9 supported this proposition when both across meeting and across time interval comparisons were made; Hypothesis 18 supported the proposition when across meeting only comparisons were made.

Hypothesis 19 tested the same proposition pertaining to the meetings of the second established university committee.

H_{19}: The transition probabilities from <u>all</u> function states in the matrices for meetings #1 and 2 of EUC II and the composite matrix are the same.

This proposition was not accepted. A X^2 of 173.2473 ($P < .005$, 90 df) was obtained. Consequently, the sub-hypothesis testing for unstable transition probabilities from <u>each</u> function state was posited.

H_{19a}: The transition probabilities from <u>each</u> function state in <u>each</u> of the meeting matrices of meetings #1 and 2 of EUC II are the same as the transition probabilities from <u>each</u> function state in the composite matrix.

H_{19a}, of course, was not accepted. Transition probabilities from <u>ambiguous</u> ($X^2 = 32.7624$, $P < .001$, 9 df), <u>clarifying</u> ($X^2 = 53.1966$, $P < .001$, 9 df), and <u>agreement</u> statements ($X^2 = 40.3235$, $P < .001$, 9 df) were not statistically similar when compared to their counterpart transition probabilities in the composite matrix of meetings #1 and 2 of EUC II. Although the data of Hypothesis 10 indicate that when the two meetings of EUC II were sub-divided into fourths the transition probabilities from function states were stable across time and meetings, when the time comparison was removed and the in-tact meetings were compared, three function states were the bases of unstable transition probabilities.

Hypothesis 20 combined the two meetings of EUC I and the two meetings of EUC II and tested the similarity of transition probabilities from function states. Inasmuch as transition probabilities from function states were stable in the EUC I meetings but unstable in the EUC II meetings, Hypothesis 20 was posited to determine if the unstable transition probabilities were absorbed by the stable meetings.

H_{20}: The transition probabilities from <u>all</u> function states in the matrices for meetings #1 and 2 of EUC I and meetings #1 and 2 of EUC II and the composite matrix are the same.

This proposition was not accepted. A X^2 of 427.8823, with 270 df, was obtained and a value of 326.2148 was sufficient to warrant rejection at the .01 alpha level. The sub-hypothesis was tested to determine which function state or states were associated with dissimilar transition probabilities across meetings.

H_{20a}: The transition probabilities from <u>each</u> function state in <u>each</u> of the meeting matrices of meetings #1 and 2 of EUC I and meetings #1 and 2 of EUC II are the same as the transition probabilities from <u>each</u> function state in the composite matrix.

This sub-hypothesis was not accepted. Transition probabilities from the same three function states that emerged as unstable for Hypothesis 19a were the unstable transition probabilties in the present sub-hypothesis.

Transition probabilities from ambiguous (X^2 = 63.0284. $P<.001$, 27 df) clarifying (X^2 = 111.6760, $P<.001$, 27 df) and agreement statements (X^2 = 72.7351, $P<.001$, 27 df) were statistically dissimilar across the four meetings when compared to the composite matrix. Apparently, the degree of instability in the transition probabilities from these three function states in the second established university committee was sufficiently high to come through, even when combined with the stable communication function pattern of the first established university committee.

Hypothesis 21 tested the degree of stability of transition probabilities from the function states of the three meetings of the established departmental committee.

> H_{21}: The transition probabilities from all function states in the matrices for meetings #1, 2, and 3 of EDC I and the composite matrix are the same.

H_{21} was not rejected. A X^2 value of 208.2099, with 180 df, was obtained and to have rejected the null hypothesis a value of 278.4777 would have to have been obtained. It was concluded, therefore, that the transition probabilities from the function states of the three EDC I meetings, like the two EUC I meetings, were stable across meetings.

The next five hypotheses tested the stability of transition probabilities in the meetings of the four student ad hoc committees.

> H_{22}: The transition probabilities from all function states in the matrices for meetings #1, 2, and 3 of SAHC I and the composite matrix are the same.

Data generated from these comparisons did not allow for the rejection of this proposition. A X^2 of 155.3669, with 180 df, was obtained and to reject Hypothesis 22 a X^2 value of 278.4777 was needed. These data further support the findings of Hypothesis 13 which found that the transition probabilities from function states when compared both across time intervals and meetings of SAHC I were stable.

> H_{23}: The transition probabilities from all function states in the matrices for meetings #1 and 2 of SAHC II and the composite matrix are the same.

H_{23} was not accepted. A X^2 value of 205.5589 ($P<.001$, 90 df) was obtained. The sub-hypothesis which identifies the specific source or sources of this instability was posited.

> H_{23a}: The transition probabilities from each function state in each of the meeting matrices of meetings #1 and 2 of SAHC II are the same as the transition probabilities from each function state in the composite matrix.

Results of the X^2 test revealed that transitions from ambiguous (X^2 = 33.2600, $P<.001$, 9 df), clarifying (X^2 = 57.0827, $P<.001$, 9 df), and agreement statements (X^2 = 24.8991, $P<.005$, 9 df) were statistically dissimilar across the two meetings, when compared to their counterpart transition probabilities in the composite matrix. Notice that these are the same function states that were found to be unstable across meetings in the two meetings of EUC II.

> H_{24}: The transition probabilities from all function states in the matrices for meetings #1 and 2 of SAHC III and the composite matrix are the same.

H_{24} was not accepted, although the decision to reject the proposition was extremely close. A X^2 value of 131.3985, with 90 df, was obtained and a value of 124.1160 was required to reject the null hypothesis at the

.01 alpha level. The sub-hypothesis was posited to identify the unstable state or states.

H_{24a}: The transition probabilities from each function state in each of the meeting matrices of meetings #1 and 2 of SAHC III are the same as the transition probabilities from each function state in the composite matrix.

Transition probabilities from two of the ten function states were found to be unstable across meetings; ambiguous statements ($X^2 = 23.6786$, $P < .005$, 9 df) and proposals ($X^2 = 36.1434$, $P < .001$, 9 df). Transition probabilities from ambiguous inputs were found to be unstable across the two meetings of EUC II and across the two meetings of SAHC II. This is the first instance of unstable transition probabilities from proposals.

H_{25}: The transition probabilities from all function states in the matrices for meetings #1 and 2 of SAHC IV and the composite matrix are the same.

H_{25} was not rejected. A X^2 of 91.6214, with 90 df, was obtained and a value of 124.1160 was needed to reject the null hypothesis. For the two meetings of the fourth student ad hoc committee, transition from function states were considered to be stable.

Hypothesis 26 combined the nine meetings of the four SAHC's to determine if the unstable transition probabilities from the function states idnetified for specific committees were sufficiently unstable to appear when the transition probability matrices of all the meetings, plus the composite matrix, were combined and compared.

H_{26}: The transition probabilities from all function states in the matrices for meetings #1, 2, and 3 of SAHC I, meetings #1 and 2 of SAHC II, meetings #1 and 2 of SAHC III, and meetings #1 and 2 of SAHC IV and the composite matrix are the same.

H_{26} was not accepted. A X^2 value of 1243.3459 (P .001, 720 df) was obtained. The sub-hypothesis was tested to determine if the unstable transition probabilities from the function states identified for SAHC II and SAHC III were responsible for the rejection of the overall comparison hypothesis.

H_{26a}: The transition probabilities from each function state in each of the meeting matrices of meeting #1, 2, and 3 of SAHC I, meetings #1 and 2 of SAHC II, meetings #1 and 2 of SAHC III, and meetings #1 and 2 of SAHC IV are the same as the transition probabilities from each function state in the composite matrix.

The same function states associated with unstable transition probabilities across the meetings of SAHC II and SAHC III were responsible for the instability in the overall comparison. Transition probabilities from ambiguous ($X^2 = 173.6012$, $P < .001$, 72 df), clarifying ($X^2 = 213.8989$, $P < .001$, 72 df), agreement ($X^2 = 147.3212$, $P < .001$, 72 df), and proposal statements ($X^2 = 308.8784$, $P < .001$, 72 df) were sufficiently dissimilar across meetings to warrant the rejection of the null hypothesis of overall comparisons.

For a closer inspection of the nature of the unstable transition probabilities from ambiguous, clarifying, and agreement function states, the ten function states were collapsed into four more general categories. The favor and agreement states were combined in a function category labelled Favorable; disfavor and disagree states were combined in a function

category called Unfavorable; the ambiguous and etcetera states were combined and referred to as the Ambiguous category; and clarifying, modifying, and request function states were combined to form the Clarify category. The proposal function state was not included in this analysis inasmuch as it is treated specifically in answering the next research question.

Table 8 displays the mean transition probabilities, by one-quarter intervals, from the Favorable category to the Clarify and Ambiguous categories for each of the four committee-types. The mean transition probabilities from Favorable states to Unfavorable states are not displayed inasmuch as the frequencies of such transitions were so low that the transition probabilities were zero, with very few scattered exceptions.

TABLE 8

Mean Probable Transitions Among Function-States, by One Quarter Intervals for Each Committee's Total Sessions

Function-State Transitions		SAHC I-IV	EUC I	EUC II	EDC I
Favorable to Favorable	t_1 $\bar{x}$ =	.17	.07	.00	.24
	t_2 $\bar{x}$ =	.26	.00	.11	.19
	t_3 $\bar{x}$ =	.14	.06	.13	.32
	t_4 $\bar{x}$ =	.29	.20	.22	.03
Favorable to Clarify	t_1 $\bar{x}$ =	.66	.43	.55	.59
	t_2 $\bar{x}$ =	.65	.83	.52	.53
	t_3 $\bar{x}$ =	.55	.81	.79	.59
	t_4 $\bar{x}$ =	.53	.80	.62	.51
Favorable to Ambiguous	t_1 $\bar{x}$ =	.17	.43	.00	.09
	t_2 $\bar{x}$ =	.07	.00	.00	.19
	t_3 $\bar{x}$ =	.15	.34	.17	.11
	t_4 $\bar{x}$ =	.19	.38	.15	.11

Recall that Hypothesis 19a revealed unstable transition probabilities from agreement statements in the meetings of EUC II; Hypothesis 23a revealed unstable transition probabilities from agreement statements in the meetings of SAHC II. The agreement function state was combined with the favor state into the category of Favorable function states. From Table 8 it is apparent why transition probabilities were found to be unstable from the Favorable function states; approximately fifty-five percent of the time when the decisioning process was in a Favorable state it mapped into a Clarify state. Transition probabilities to the Favorable states and Ambiguous states were much lower. In short, the transitions from the Favorable function states were not distributed equally among the other states.

Table 9 displays the mean transition probabilities from the Unfavorable states to the Favorable, Unfavorable, and Clarify function states. The mean transition probabilities from Unfavorable to Ambiguous states are not shown because of insufficient frequencies. As can be seen, the probabilities of the three types of transitions displayed are both relatively low and about equally probable. Data from Hypotheses 9 through 26 predicted similarity of transition probabilities from Unfavorable function states to all of the function states. But those data did not reveal how low the mean transition probabilities were from the Unfavorable states. Simply stated, the decisioning processes of the four committee-types were not in Unfavorable states sufficiently frequently to generate very high transition probabilities from those Unfavorable states. If degree of conflict is indicated, to some extent, by the degree of Unfavorable statements and transitions from Unfavorable statements to Unfavorable statements, then none of the committee meetings were characterized by much conflict during any of the one-quarter time intervals.

Table 10 displays the mean transition probabilities from Ambiguous states to all four of the re-classified function states. Hypothesis 19a indicated that transition probabilities from ambiguous states were unstable in the meetings of EUC II. Hypothesis 20a combined the meetings of the two established university committees and indicated that transition probabilities from ambiguous states were unstable across all four meetings of the two established university committees. Hypothesis 23a revealed that transition probabilities from ambiguous states were unstable in the meetings of SAHC II; Hypothesis 24a supported the same proposition for SAHC III; and Hypothesis 26a, which tested transition probability similarity for all SAHC committees, supported the conclusion that when combined, transition probabilities from ambiguous function states were unstable across all SAHC meetings.

From Table 10 it is apparent why transition probabilities from the Ambiguous function states were unstable in all meetings except those of the established departmental committee. In the case of the EDC I, transition probabilities from the Ambiguous states to all four re-classified function states were relatively evenly distributed. But with respect to the other three committee-types, the probabilities of transitions from the Ambiguous states to the Clarify states were significantly higher than for the transition probabilities associated with the three other

TABLE 9

Mean Probable Transitions Among Function-States, by One Quarter Intervals for Each Committee's Total Sessions

Function-State Transitions		SAHC I-IV	EUC I	EUC II	EDC I
Unfavorable to Favorable	t_1 $\bar{x}$:	.11	.00	.25	.08
	t_2 $\bar{x}$:	.04	.16	.20	.18
	t_3 $\bar{x}$:	.14	.00	.00	.04
	t_4 $\bar{x}$:	.05	.16	.00	.00
Unfavorable to Unfavorable	t_1 $\bar{x}$:	.00	.00	.00	.04
	t_2 $\bar{x}$:	.02	.29	.20	.30
	t_3 $\bar{x}$:	.05	.00	.00	.12
	t_4 $\bar{x}$:	.05	.00	.00	.00
Unfavorable to Clarify	t_1 $\bar{x}$:	.08	.00	.25	.08
	t_2 $\bar{x}$:	.20	.41	.10	.28
	t_3 $\bar{x}$:	.01	.00	.00	.04
	t_4 $\bar{x}$:	.13	.33	.25	.00

TABLE 10

Mean Probable Transition Among Function-States, by One Quarter Intervals for Each Committee's Total Sessions

Function-State Transitions		SAHC I-IV	EUC I	EUC II	EDC I
Ambiguous to Favorable	t_1 $\bar{x}$ =	.04	.12	.00	.06
	t_2 $\bar{x}$ =	.01	.10	.05	.14
	t_3 $\bar{x}$ =	.03	.20	.18	.22
	t_4 $\bar{x}$ =	.06	.15	.00	.22
Ambiguous to Unfavorable	t_1 $\bar{x}$ =	.00	.00	.00	.06
	t_2 $\bar{x}$ =	.00	.00	.00	.14
	t_3 $\bar{x}$	.02	.00	.00	.22
	t_4 $\bar{x}$ =	.05	.15	.00	.00
Ambiguous to Clarify	t_1 $\bar{x}$ =	.40	.37	.52	.46
	t_2 $\bar{x}$ =	.55	.67	.38	.21
	t_3 $\bar{x}$ =	.43	.35	.39	.51
	t_4 $\bar{x}$ =	.42	.55	.44	.47
Ambiguous to Ambiguous	t_1 $\bar{x}$ =	.40	.69	.39	.38
	t_2 $\bar{x}$ =	.34	.50	.44	.05
	t_3 $\bar{x}$ =	.29	.35	.46	.36
	t_4 $\bar{x}$ =	.46	.12	.46	.32

types of transitions. Stated another way, approximately one-half of the time when the decisioning processes of the SAHC and EUC's were in the Ambiguous states, they would map into one of the Clarify states.

Hypothesis 19a indicated that transition probabilities from the clarifying function state were unstable across the meetings of EUC II. When the meetings of EUC I and EUC II were combined in Hypothesis 20a, transition probabilities from clarifying states were found to be unstable across all four meetings of the two committee-types. Hypotheses 23a, 24a, and 26a, taken together, support the proposition that transition probabilities from the clarifying function state were unstable across the nine meetings of the four student ad hoc committees. Table 11 displays the transition probabilities from the Clarify state to the four re-classified function states.

As can be seen readily, the probabilities from the Clairfy states mapping into the same Clarify states are significantly higher than they for the other three transition-types. Approximately sixty percent of the time, when the decisioning processes of the committees involved were in a Clarify function state, they remained in that same state.

The final consideration in answering both the third and fourth research questions concerned the stability of the mean number of probable transitions from one function state at T_1 to one of the other ten function states at T_2. These data provide one indicator of the density of the interaction characterizing the decisioning processes of the four committee-types investigated. The higher the mean number of probable transitions, the more rapid and "dense" or compressed the rate at which verbal function statements were input to the decisioning processes. Figure 3 graphically displays the mean number of probable transitions among function states, by one-quarter intervals, for the three established committees. Figure 4 displays the same information regarding the four student ad hoc committees.

In general, the mean number of probable transitions for function states curves for the three established committees are similar. The density of interaction in the meetings of EUC I and EUC II drops from interval two to interval three and then rises from interval three to interval four. The difference between the two established university committees is that for EUC I the decisioning processes began at a very low level of interaction density whereas for EUC II the processes were characterized from the outset by high interaction density. These initial differences, however, were completely equalized during interval. The processes of the two EUC's were mapping an average of 18.5 verbal inputs.

There was considerably more variability in interaction density among the four student ad hoc committees. Only two committees had similar profiles; SAHC I and SAHC IV. For both of these committees the interaction density dropped slightly from interval one to interval two, rose back to their initial levels during interval three, and then rose sharply during interval four.

TABLE 11

Mean Probable Transitions Among Function-States, by One Quarter Intervals for Each Committee's Total Sessions

Function-State Transitions		SAHC I-IV	EUC I	EUC II	EDC I
	t_1 $\bar{x}$	.22	.25	.07	.16
Clarify to Favorable	t_2 $\bar{x}$	.22	.30	.19	.30
	t_3 $\bar{x}$	.18	.39	.31	.20
	t_4 $\bar{x}$	.19	.28	.35	.09
	t_1 $\bar{x}$	.00	.00	.00	.00
Clarify to Unfavorable	t_2 $\bar{x}$	.00	.00	.00	.12
	t_3 $\bar{x}$	.04	.00	.00	.00
	t_4 $\bar{x}$	.00	.00	.06	.00
	t_1 $\bar{x}$	.73	.73	.70	.66
Clarify to Clarify	t_2 $\bar{x}$	.68	.60	.74	.57
	t_3 $\bar{x}$	.68	.51	.75	.34
	t_4 $\bar{x}$	.70	.79	.65	.51
	t_1 $\bar{x}$	.06	.00	.00	.08
Clarify to Ambiguous	t_2 $\bar{x}$	.32	.00	.25	.02
	t_3 $\bar{x}$	.10	.00	.06	.05
	t_4 $\bar{x}$	.14	.00	.30	.00

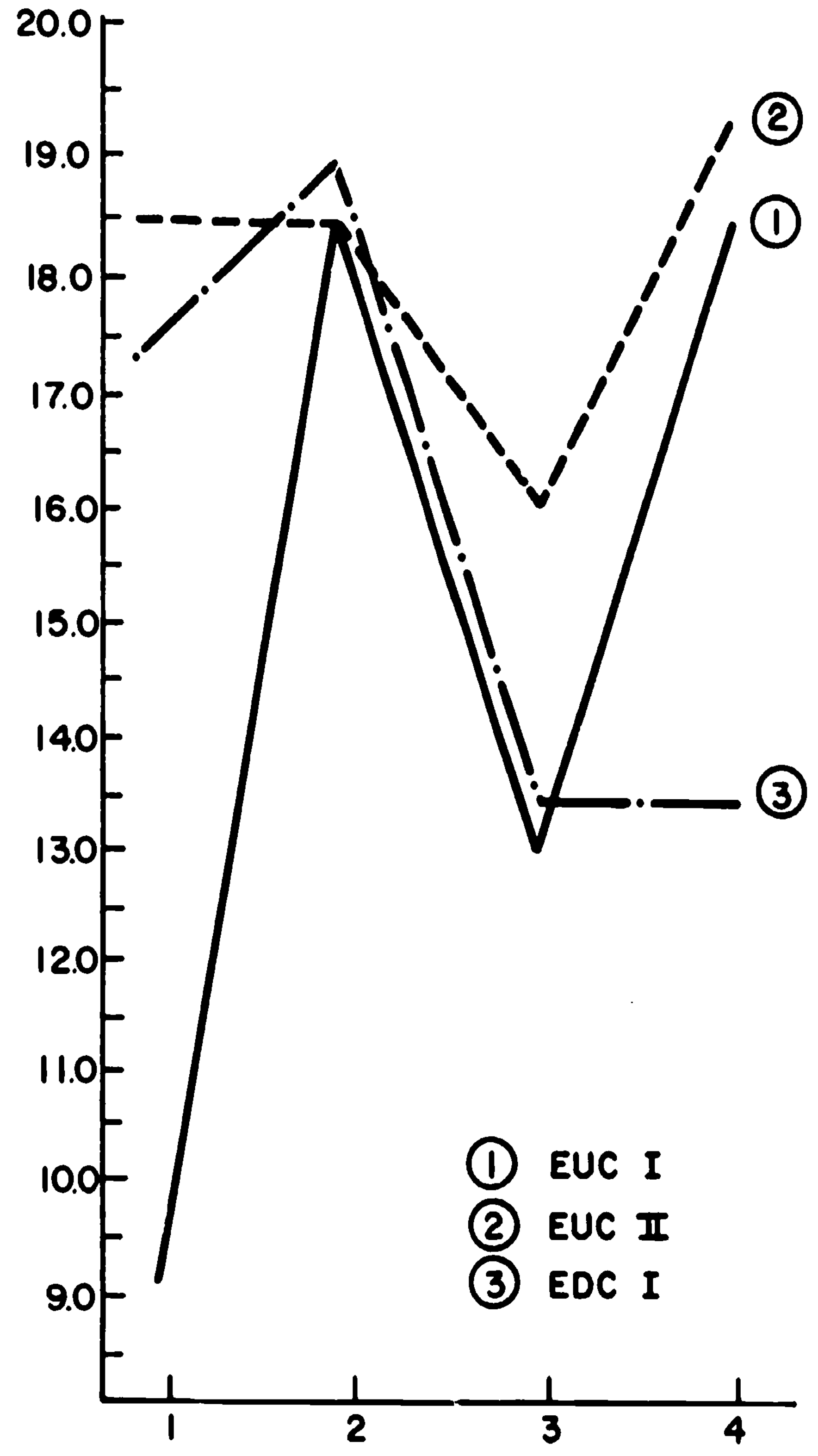

Figure 3. Mean Number of Probable Transitions from One Function State at T_1, to One of the Other Ten Function States at T_2, by One-Quarter Intervals, in the Meetings of the Three Established Committees

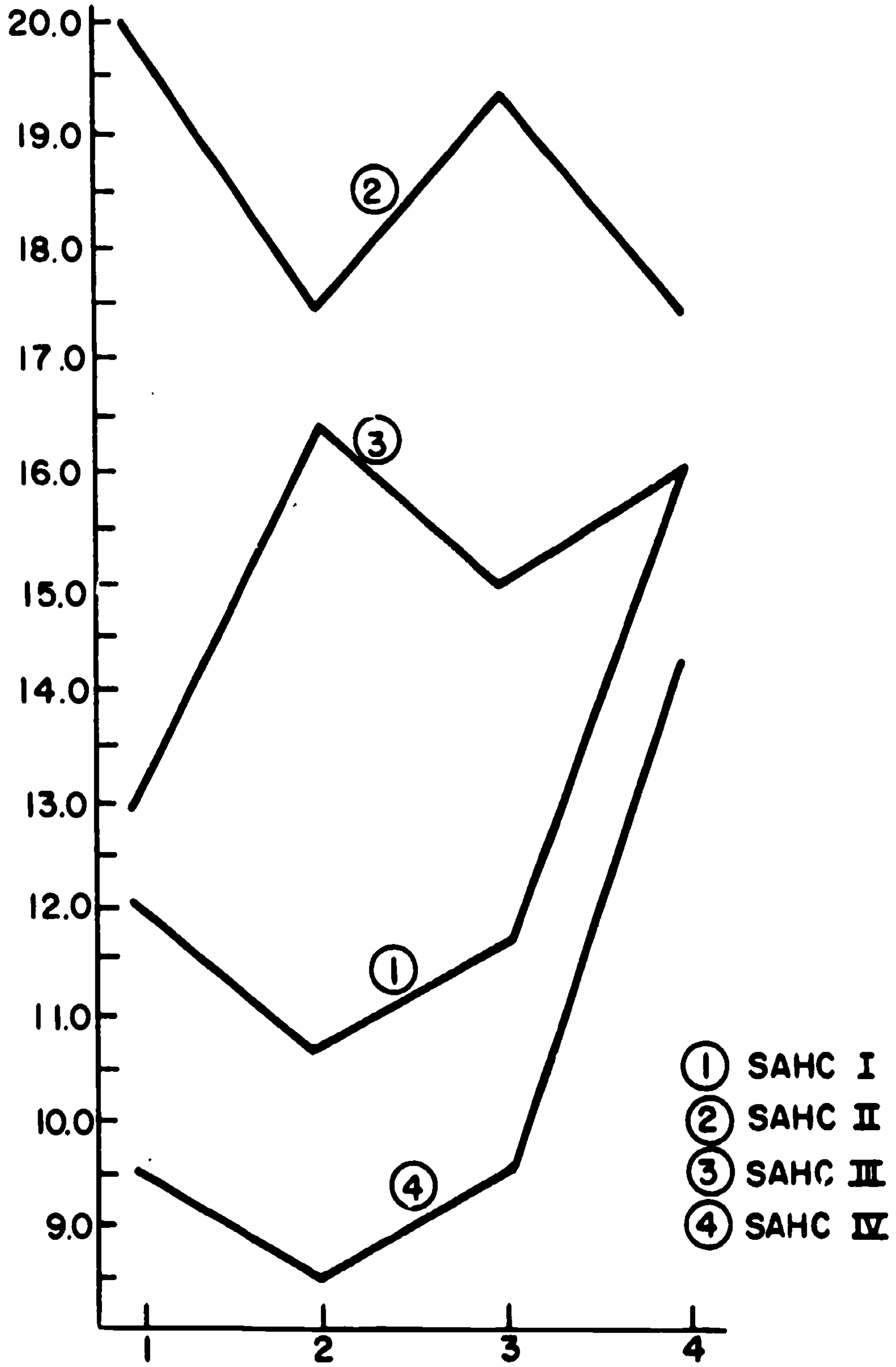

Figure 4. Mean Number of Probable Transitions from One Function State at T_1 to One of the Other Ten Function States at T_2, by One-Quarter Intervals, in the Meetings of the Four Ad Hoc Committees.

The profile for SAHC II and SAHC III are almost the reciprocal of one another. Both the second and third ad hoc committees, however, had a higher overall interaction density, as measured by the mean number of probable transitions among function states, than the first and the fourth committees.

Research Question #5. Do the different types of committees studied differ in terms of the sources and frequencies of proposals input to the decisioning processes?

The seven meetings of the three established committees were analyzed first. The number of proposals initiated by each member-type were compared for each of the seven meetings. Table 12 displays the number of proposals initiated by each speaker-type by each time interval for meeting #1 of EUC I.

The X^2 One-Sample Test (Siegel, 1956, pp.42-47) was used to test whether a significant difference existed between the observed frequency of proposals initiated and the expected number of proposals based on the null hypothesis. The procedure for determining significant idfferences was as follows: an overall X^2 was computed to determine if there were any differences among the number of proposals initiated by each speaker-type; when a significant X^2 value was obtained, the similarity of number of proposals initiated by each pair of speakers was determined.

H_{27}: The number of proposals initiated by the faculty members, student members, and chairperson during meeting #1 of EUC I is the same.

A X^2 value of 22.1967 ($P < .001$, 2 df) was obtained. It is apparent from inspecting Table 12 that the faculty members initiated more proposals during the meeting than did either the student members or the chairperson.

H_{27a}: The number of proposals initiated by the chairperson and the student members is the same during meeting #1 of EUC I.

This null hypothesis was not accepted. A X^2 value of 8.6741 ($P < .01$, 1 df) was obtained. It was concluded that, in meeting #1 of EUC I, the chairperson initiated significantly more proposals than did all of the student members combined.

H_{27b}: The number of proposals initiated by the chairperson and the faculty members is the same during meeting #1 of EUC I.

This hypothesis was not rejected. A X^2 value of 6.2675 was obtained and a vlue equal to or greater than 6.6400 was needed to reject thenull hypothesis at the .01 alpha level.

Concerning the proposals initiated during meeting #1 of EUC I it was concluded that faculty members initiated significantly more proposals than did the student members; that the chairperson initiated significantly more proposals than did the student members; but that there was not a statistically significant difference between the number of proposals initiated by the chairperson and the faculty members.

TABLE 12

Number of Proposals Initiated by the Faculty Members, Student Members, and Chairperson During Meeting #1 of EUC I

Speaker	Time Interval	Proposal Frequency	Total	$\bar{X}$
	1	2	25	6.25
Faculty	2	3		
	3	4		
	4	16		
	1	0	1	.25
Student	2	1		
	3	0		
	4	0		
	1	1	12	3
Chairperson	2	2		
	3	6		
	4	3		

Hypothesis 28 tested the hypothesis of no difference regarding the proposals initiated during the second meeting of EUC I.

H_{28}: The number of proposals initiated by the faculty members, student members, and chairperson during meeting #2 of EUC I is the same.

H_{28} was not accepted. A X^2 value of 22.5332 ($P < .001$, 2 df) was obtained. Inspecting Table 13 indicates that the faculty members initiated more proposals than did the student members. But it is not clear if

TABLE 13

Number of Proposals Initiated by the Faculty Members, Student Members, and Chairperson During Meeting #2 of EUC I

Speaker	Time Interval	Proposal Frequency	Total	$\bar{X}$
	1	5	28	7
Faculty	2	6		
	3	10		
	4	7		
	1	0	2	.50
Student	2	0		
	3	2		
	4	0		
	1	3	14	3.5
Chairperson	2	4		
	3	1		
	4	6		

the faculty members initiated significantly more proposals than the chairperson or if the chairperson initiated significantly more proposals than the student members. Two sub-hypotheses were tested to make these determinations.

H_{28a}: The number of proposals initiated by the chairperson and the student members is the same during meeting #2 of EUC I.

This null hypothesis was not accepted. A X^2 value of 9.9998 ($P < .01$, 1 df) was obtained. It was concluded that during this meeting of EUC I, the chairperson initiated significantly more proposals than did all of the student committee members combined.

H_{28b}: The number of proposals initiated by the chairperson and the faculty members is the same during meeting #2 of EUC I.

Like the previous null hypothesis, H_{28b} was not accepted. A X^2 value of 9.2299 ($P < .01$, 1 df) was obtained. It was concluded that, during this particular meeting, the faculty members initiated significantly more proposals for committee consideration than did the chairperson.

Recall that for meeting #1 of EUC I, no significant difference was found between the number of proposals faculty members initiated and the number of proposals the chairperson initiated. For meeting #2, however, there was a significant difference. Hypothesis 29 was posited to determine if the significant difference persisted when meetings #1 and 2 were combined. It can be assumed that since statistically significant differences were found for the other comparisons, combining the two meetings would also produce statistically significant differences for the same comparisons.

H_{29}: The number of proposals initiated by the chairperson and the faculty members is the same during meetings #1 and 2 of EUC I.

H_{29} was not accepted. A X^2 value of 9.1149 ($P < .01$, 1 df) was obtained. It was concluded that for the two meetings of EUC I, faculty members initiated significantly more proposals than either student members or the chairperson, and that the chairperson initiated significantly more proposals than did the student members.

Hypothesis 30 tested the hypothesis of no difference for the proposals initiated by the three member-types for the first meeting of EUC II.

H_{30}: The number of proposals initiated by the faculty members, student members, and the chairperson is the same during meeting #1 of EUC II.

This hypothesis was not rejected. A X^2 of .9999 was obtained and a X^2 value of 6.6400 was needed for rejection at the .01 alpha level. Table 14 clearly reveals why no differences were found.

The next hypothesis tested the same proposition regarding meeting #2 of EUC II.

H_{31}: The number of proposals initiated by the faculty members, student members, and the chairperson is the same during meeting #2 of EUC II.

This hypothesis of no difference was not accepted. A X^2 of 32.3145 ($P < .001$, 2 df) was obtained. Two sub-hypotheses were posited to determine if the difference between the number of proposals initiated by the chairperson and the faculty members was significantly different and if the difference between the number of proposals initiated by the chairperson and student members was significantly different. Table 15 displays the frequency data of meeting #2 of EUC II.

TABLE 14

Number of Proposals Initiated by the Faculty Members, Student Members, and Chairperson During Meeting #1 of EUC II

Speaker	Time Interval	Proposal Frequency	Total	$\bar{X}$
	1	0	2	.50
Faculty	2	0		
	3	0		
	4	2		
	1	0	4	1
Student	2	0		
	3	0		
	4	4		
	1	0	4	1
Chairperson	2	0		
	3	0		
	4	4		

TABLE 15

Number of Proposals Initiated by the Faculty Members, Student Members, and Chairperson During Meeting #2 of EUC II

Speaker	Time Interval	Proposal Frequency	Total	$\bar{X}$
	1	15	68	17
Faculty	2	31		
	3	15		
	4	17		
	1	0	18	4.5
Student	2	0		
	3	2		
	4	16		
	1	10	39	9.75
Chairperson	2	8		
	3	11		
	4	10		

H_{31a}: The number of proposals initiated by the chairperson and the student members is the same during meeting #2 of EUC II.

This null hypothesis was not accepted. A X^2 of 8.3132 ($P < .01$, 1 df) was obtained. It was concluded that, during this particular meeting, the chairperson initiated significantly more proposals than did the student members.

H_{31b}: The number of proposals initiated by the chairperson and the faculty members is the same during meeting #2 of EUC II.

This hypothesis was not accepted either. A X^2 value of 7.7661 ($P < .01$, 1 df) was obtained. The general conclusion for meeting #2 of EUC II is that the faculty members initiated significantly more proposals than did the other member-types. The chairperson initiated significantly more proposals than did the student members.

Hypothesis 32 combined the two meetings of EUC II to determine overall differences, if any. Recall that no significant differences were found in terms of proposal initiation by member-type for the first meeting of EUC I. But then very few proposals were initiated totally.

H_{32}: The number of proposals initiated by the faculty members, student members, and the chairperson is the same during meetings #1 and 2 of EUC II.

This hypothesis was not accepted. . X^2 of 35.8774 ($P < .001$, 2 df) was obtained, which indicated that although there were no significant differences when meeting #1 was considered by itself, when both meetings of the second established university committee were combined, significant differences were obtained. Looking at Tables 14 and 15 reveals that faculty members initiated significantly more proposals than did the student members. Two additional hypotheses were posited to determine if there were significant differences between chairperson and student members, and chairperson and faculty members.

H_{32a}: The number of proposals initiated by the chairperson and the student members is the same during meetings #1 and 2 of EUC II.

This sub-hypothesis was not accepted. A X^2 of 6.6967 ($P < .01$, 1 df) was obtained.

H_{32b}: The number of proposals initiated by the chairperson and the faculty members is the same during meetings #1 and 2 of EUC II.

This sub-hypothesis also was not accepted. A X^2 value of 11.0382 ($P < .001$, 1 df) was obtained. The conclusion drawn from Hypotheses 32, 32a, and 32b is that when the two meetings of EUC II are combined the same results are obtained as when the two meetings of EUC I are combined. Namely, faculty members initiated significantly more proposals than either student members or the chairperson, the chairperson initiated significantly more proposals than did the student members.

The next group of hypotheses concern the proposals initiated during the three meetings of the established departmental committee. Recall that this committee had only one faculty member and he was the chairperson. Consequently, only two speaker-types are identified; chairperson and student members. If significant differences are found in the overall comparison, the order of the difference can be concluded without positing additional sub-hypotheses.

H_{33}: The number of proposals initiated by the student members and the chairperson is the same during meeting #1 of EDC I.

H_{33} was not rejected. A X^2 of 3.2466, with 1 df, was obtained and a value of 6.6400 was necessary to reject the null hypothesis. It was concluded that in meeting #1 of EDC I, the number of proposals by the chairperson and the student members did not differ significantly. This is a noteworthy findings inasmuch as there were nine student members and one chairperson. The chairperson, as an individual committee member, was making approximately nine times as many proposals as any other single committee member.

H_{34}: The number of proposals initiated by the student members and the chairperson is the same during meeting #2 of EDC I.

H_{34} was not rejected. A X^2 of 3.3332, with 1 df, was obtained whereas a value of 6.6400 was needed for rejection. Again, the conclusion was reached that there were no statistically significant differences between the chairperson and the student members in terms of the number of proposals initiated during meeting #2 of EDC I.

H_{35}: The number of proposals initiated by the student members and the chairperson is the same during meeting #3 of EDC I.

Like Hypotheses 33 and 34, Hypothesis 35 was not rejected. A X^2 of .0276 was obtained, with 1 df, and a value of 6.64 was necessary for rejection at the .01 alpha level. Tables 16 through 18 display the proposals initiated, by member-types, for meetings #1, 2, and 3 of EDC I.

The general conclusion to be drawn from test results of Hypotheses 27 through 35 is that in the two established committees, faculty members initiate the most proposals, chairpersons initiate significantly fewer than faculty members but significantly more than student members. In the meetings of the one established departmental committee, one chairperson initiated about the same number of proposals as did the nine student members.

The final analysis of initiated proposals during the meetings of the seven committees studied was to simply compute the mean number of proposals initiated, regardless of their sources, by one-quarter intervals in the seven committees. Figure 5 illustrates the results of those computations.

Several differences between the established and ad hoc committees are noteworthy. First, with the very slight exception of the number of proposals initiated by EUC II during the final time interval, the four student ad hoc committees initiated more proposals in every interval of their meetings than did the members of the three established committees. Second, there was an increase in the mean number of proposals initiated during the last time interval for all four student ad hoc committees. The degree of increase varied among the four committees, but an increase was apparent in all four cases. For EUC I and EDC I, the number of proposals initiated during the final time interval dipped. EUC II, which had no proposals initiated during the first time interval, had an increase in mean number of proposals initiated during the final interval. Without regard for proposal quality, for which no judgements were rendered, it is apparent that the all student committees generated more proposals in all time intervals of their meetings than did the established committees with a faculty membership and a faculty chairperson.

TABLE 16

Number of Proposals Initiated by the Faculty Members, Student Members, and Chairperson During Meeting #1 of EDC I

Speaker	Time Interval	Proposal Frequency	Total	$\bar{X}$
	1	0	0	0
Faculty	2	0		
	3	0		
	4	0		
	1	9	23	5.75
Student	2	5		
	3	2		
	4	7		
	1	2	37	9.25
Chairperson	2	12		
	3	14		
	4	9		

TABLE 17

Number of Proposals Initiated by the Faculty Members, Student Members, and Chairperson During Meeting #2 of EDC I

Speaker	Time Interval	Proposal Frequency	Total	$\bar{X}$
	1	0	0	0
Faculty	2	0		
	3	0		
	4	0		
	1	1	11	2.5
Student	2	6		
	3	2		
	4	1		
	1	6	20	5
Chairperson	2	7		
	3	3		
	4	4		

TABLE 18

Number of Proposals Initiated by the Faculty Members, Student Members, and Chairperson During Meeting #3 of EDC I

Speaker	Time Interval	Proposal Frequency	Total	$\bar{X}$
	1	0	0	0
Faculty	2	0		
	3	0		
	4	0		
	1	2	17	4.25
Student	2	3		
	3	12		
	4	0		
	1	8	16	4
Chairperson	2	1		
	3	6		
	4	1		

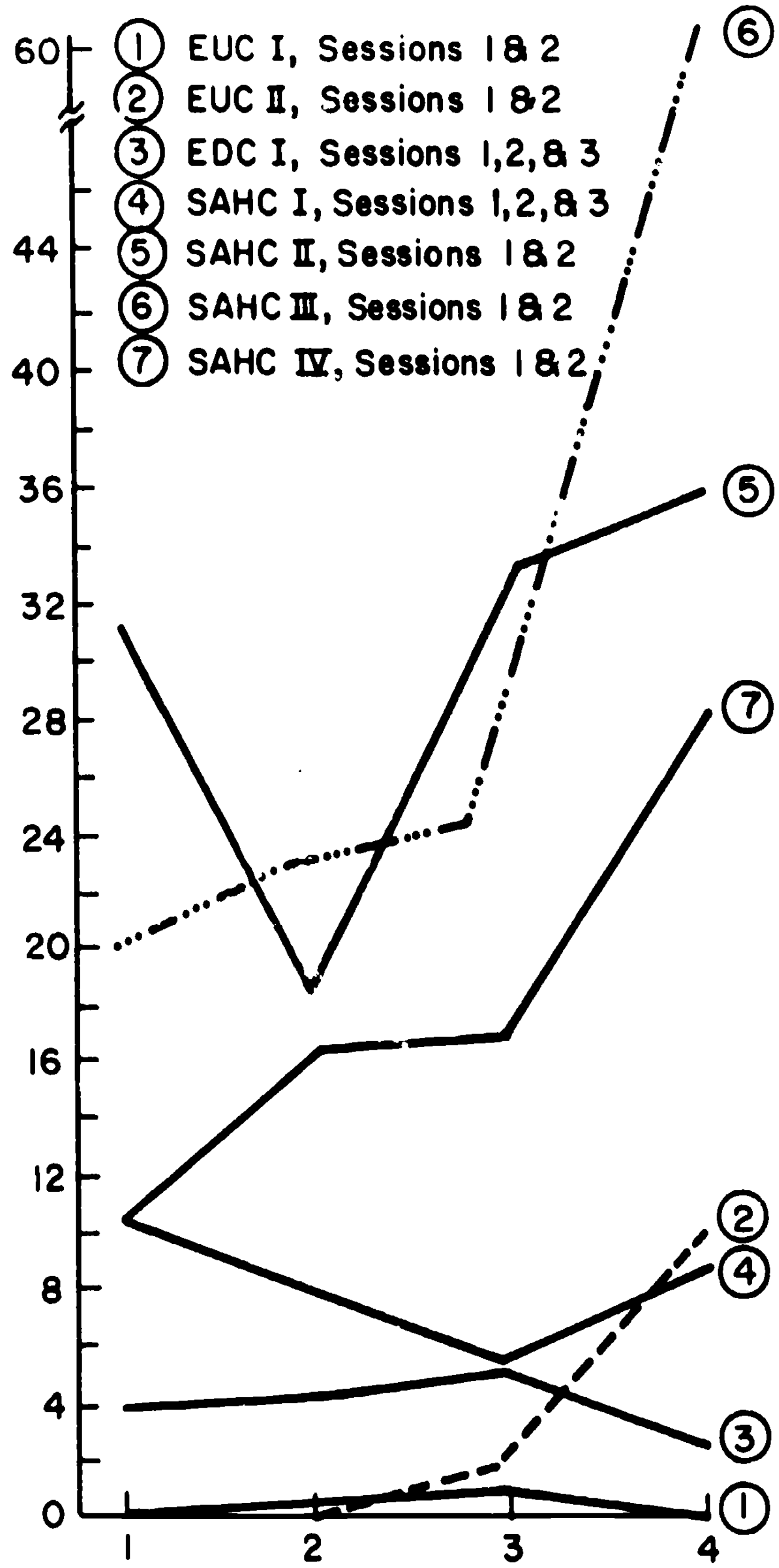

Figure 5. Mean Number of Proposals Initiated, by One-Quarter Intervals, in the Seven Committees.

Conclusions

This study was designed to answer five research questions concerning the decisioning processes of seven committees; two established university committees, one established departmental committee, and four student ad hoc committees.

Research Question #1 asked to what extent transitions from speaker-mode states were stable when both individual meetings were compared in their entirety and when those meetings were sub-divided into time intervals and compared across time intervals. Four major hypotheses and one minor hypothesis were posited.

Conclusion. The pattern of speaker-mode states across committee meetings and across time intervals was stable in two of the three established committees studied. The four student ad hoc committees were not included as data to answer this question because they included only one type of member and there were no designated chairpersons. In one of the three established committees, transitions from the three assertion mode states were unstable across meetings and time intervals. But when combined with the other established university committee for comparison, the instability of transitions from assertion mode states was absorbed.

Research Question #2 was concerned with the extent to which the pattern of transitions from speaker-mode states was stable when meetings were compared in their entirety, without sub-dividing them into time intervals. Four hypotheses and three minor ones were posited to answer the second research question.

Conclusion. The pattern of speaker-mode states across committee meetings was unstable in the two established university committees and stable in the meetings of the one established departmental committee. The speaker-mode states responsible for the instabilities across meetings were faculty assertions, chairperson assertions, and faculty proposals. These data were displayed so that just the communicative modes were analyzed; the speaker or source of the input was ignored. These analyses determined to what extent the decisioning processes of the three committees involved were characterized by asserting information, requesting information, and proposing courses of action, or combination transitions among those three mode states. It was clear that, irrespective of minor proportional fluctuations over time, the most prevalent communicative transition to occur during the decisioning processes of the established committees was from one assertion statement to another. Relatively little time was spent requesting information. When proposals were made, which was less frequent than requests for information, assertions were more likely to follow than were questions about those proposals.

Research Question #3 focused on the second behavioral dimension of the systems model of decisioning processes; the communicative function dimension. Specifically, this question concerned the extent to which the pattern of communication function states were stable both across committee meetings and across time intervals. To answer the question, seven major hypotheses were tested.

Conclusion. The pattern of communicative function states were stable when transition probabilities from those states were compared across time intervals for the sixteen meetings of the seven committees studied.

Inasmuch as function states could and were identified, irrespective of the speaker or source of such statements, the meetings of all seven committees could be included to answer the third research question. Although transition probabilities from assertion mode states were unstable in some instances, the transition probabilities from function states were not dissimilar enough across meetings and time intervals to be considered unstable. Stated another way, the function of the verbal statements, and the transition probabilities from one type of function statement to all other function statements, were relatively evenly distributed both among different meetings of the committees and across time intervals of those meetings.

Research Question #4 asked about the extent to which the pattern of transitions from the ten function states was stable when the committee meetings were compared in their entireties, without being sub-divided into time intervals. Nine major hypotheses and five minor ones were tested to answer this question.

Conclusion. The transition probabilities from the ten function states were stable for one of the established university committees and unstable for the other. Subsequent analysis indicated that the transition probabilities from ambiguous, clarifying, and agreement function states were the sources of the instability in the function state pattern of the second established university committee. When the four meetings of the two committees were combined, the unstable transition probabilities from those three function states--ambiguous, clarifying, and agreement--were sufficiently pronounced to justify the overall conclusion that the function state pattern was unstable across the four meetings of the two committees.

The three meetings of the established departmental committee were found to be stable with regard to the transition probabilities from the function states. In other words, there were no significant differences among the three meetings in terms of the probabilities with which one function statement mapped into the other function states.

When the nine meetings of the four student ad hoc committees were compared, the meetings of two of the committees were found to be unstable with respect to the transition probabilities from the function states. Transitions from those same three function states--ambiguous, clarifying, and agreement--and from proposals were found to be unstable across the meetings of two committees. When the nine meetings of these four student ad hoc committees were compared, these four states were sufficiently unstable to conclude that for all the student ad hoc meetings, transition probabilities from these four states were unstable.

Combining the results obtained from these four research questions supports the conclusion that, for the committees studied, the decisioning processes varied significantly across meetings along the assert mode and the ambiguous, clarifying, agreement, and proposal functions. Stated another way, when the decisioning processes were in the assert mode, the mode to which they mapped themselves varied significantly across meetings. Likewise, when the decisioning processes were in the ambiguous, clarifying, agreement, and proposal function states, the next state to which they would map themselves varied significantly across different meetings.

Research question #5 was interested in whether the committees differred in terms of the sources of, and frequencies with which,

proposals were initiated during the decisioning processes. Nine major and eight minor hypotheses were tested to provide the answer.

Conclusion. In the four meetings of the two established university committees, faculty members initiated significantly more proposals than did either the chairperson or the student members. The chairperson initiated significantly more proposals than all of the student members combined. In the three meetings of the established departmental committee, the only faculty member was also the chairperson; the rest of the members were students. There were no significant differences between the number of proposals the students initiated and the number of proposals the chairperson initiated. This finding is interesting insofar as the chairperson had to initiate nine times as many proposals as would be expected from each individual student member for the hypothesis of no difference to be supported.

When the meetings of all seven committees were compared, it was found that the student ad hoc committees initiated more proposals during all time intervals than did the three established committees. Furthermore, all student ad hoc committees increased the number of proposals initiated uring the last time interval but two of the three established committees decreased the mean number of initiated proposals during the final time interval.

The general conclusion is that in committees with a majority of faculty members and a faculty chairperson, the student members initiate the fewest number of proposals of any of the committee members. In these committee meetings, most of the time is devoted to asserting information as opposed to requesting information or initiating proposals. These meetings vary significantly, from meeting to meeting, in what they do immediately after a member makes an assertion which functions to clarify a proposal, render a proposal ambiguous, agree with the previous statement, or propose a course of action. On the other hand, the meetings of the established departmental committee were relatively stable both in terms of making transitions from modes and from functions. The most variability, in terms of proposals initiated, interaction density, and mode and function transitions, occurred in the student ad hoc committees.

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APPENDIX A.--LOGISTIC DETAILS OF THE STUDY

On the day of their regularly scheduled meetings, committee members were picked up in a university bus and transported to the Behavioral Sciences Laboratory. The main conference room of the Laboratory, where the meetings were held, was designed in quadrants with microphone and telephone inputs as well as light controls specific to each of the four quarters of the large room. Walnut panels were positioned to divide the Laboratory into smaller rooms for the smaller committees, specifically the ad hoc student committees. There were sixteen microphones and sixteen telephone inputs--four for each quadrant. The telephones were used for giving instructions from the control room, which was immediately behind the conference room and visibly conncected via a one-way mirror. Each quadrant was equipped with four incandescent spotlights and four fluorescent panels. These panels had two illumination levels, the higher level was particularly appropriate for video tape recording.

The video tape recording equipment included a standard GE studio camera and a well mounted, remote, portable camera which was designed for monitoring and playback. An intercom telephone system was capable of meeting all communication needs, permitting two-way investigator-subject communication, precluding intersubject communication when necessary, or permitting only prescribed communication patterns.

Shortly after the completion of each committee meeting, members were supposed to have engaged in a stimulate recall procedure, which was discussed in the initial proposal. During these stimulated recall sessions, committee members were to have watched video taped replays of selected one minute segments of their decisioning process over monitors situated in separate cubicles. Each cubicle was equipped with a microphone and each microphone was assigned to a separate channel of a twenty-four track audio tape recorder. As each member watched the video taped segments he was to answer the investigator's probes (delivered over the intercom system) onto a separate channel of the twenty-four track tape recorder but "over" his verbal decisioning behavior. Thus, each committee member was to have recorded on two channels; one for his decisioning verbal behavior and one for his stimulated recall verbal behavior. Each committee member's decisioning and stimulated recall behavior was to have been transcribed for subsequent coding, analysis, and interstructuring with other member's behaviors.

However, our attempts to used stimulated recall with non-laboratory groups was not successful. During the summer months of 1972, student pilot groups were used to try out alternative ways of administering the stimulated recall procedure. The <u>first</u> method was to ask open-ended questions following each segment of the decisioning process the subjects had viewed. The <u>second</u> method was to ask specific questions about the segment of the process just viewed. The <u>third</u> method was to scale standard reactions a subject might have to watching his decisioning behavior and have the subjects respond to each segment on a paper-and-pencil instrument. The pilot groups rund during the summer months of 1972 preferred responding orally to open-ended questions. The difficulty with this procedure was that some subjects took more time than others to report their thoughts and feelings about what they had just viewed. The brief responders reported that they got bored, impatient, and tended to

"get out of the mood" while waiting on the long responders Consequently, the level of insight and involvement in the stimulated recall procedure varied a great deal across subjects and across time.

The pilot groups reported that they felt too constrained using the second and third methods. The specific questions were too narrow and subjects said they felt frustrated not being able to respond about their thoughts and feelings more freely. With the paper-and-pencil method, subjects reported loosing interest quickly and not feeling very involved in the stimulated recall process.

In the autumn of 1972, at the outset of the major study, we were prepared to have the seven subject committee members respond to from ten to fifteen equally spaced one-minute segments of their decisioning processes. However, we were confronted with several problems that made collecting the stimulated recall data difficult and the reporting of it unadvisable. First, the committees had added more members to their ranks compared to the previous year. Consequently, the time required to transcribe verbal stimulated recall protocols would have been prohibitively expensive. To remedy this problem, we decided to ask committee members to respond to seven very general and open-ended questions using a paper-and-pencil scaling method.

Second, not all committee members were ablt to engage in the stimulated recall procedure immediately after each committee meeting because of schedule conflicts. Other committee members were unable to engage in stimulated recall at all because Laboratory hours and their schedules were in conflict. As a result, not all committee members generated stimulated recall data.

Third, members reported that the activity seemed artificial. When asked if they sould have been more involved had they been able to respond to stimulated recall questions verbally they indicated that would have made a marked difference.

Because of these difficulties, the validity of the data that were collected is questionable and is not included in this report. Only analyses of verbal behavior data are reported. The money earmarked for transcribing stimulated recall protocols was channelled instead into writing more sophisticated computer programs for the identification and analyses of patterns of verbal decisioning behavior.

A program is needed for coding verbal behavior directly, eliminating the time consuming and costly procedure of transcribing verbally reported stimulated recall answers, coding these transcribed answers, then feeding the coded data into an appropriate program. We are presently at work designing a program because stimulated recall, as a technique for eliciting data regarding subjective states, is most promising for many forms of interpersonal interaction research.

APPENDIX B.--COMPUTATION OF UNITIZING RELIABILITY

Cuetzkow's (1950) formula was used to obtain estimates of the reliability of two coders unitizing the decisioning process transcripts.

$$\frac{\sigma}{h} = \frac{\overset{U}{\sqrt{2}\ \sqrt{N}\ \sqrt{1 - U^2}}}{t}$$

$\frac{\sigma}{h}$ is a Pearson coefficient of variation, 2 represents the number of coders, N is the number of different segments of coded material, U is the obtained value of unitizing reliability, and t is the value of the t statistic at either the .05 or .01 level of significance. $\frac{\sigma}{h}$ approaches the value of zero as the ability of the coders to unitize approaches perfection.

The value of t was set at the .01 level of significance and $\frac{\sigma}{h}$ was approximately .03 in this study.

APPENDIX C.--COMPUTATION OF CATEGORIZING RELIABILITY

Guetzkow (1950) demonstrates that the expected limits of the theoretical proportion of agreement are given by,

$$P = \frac{t^2 + 2nP'}{2(t^2 + n)} \pm \frac{\sqrt{(t^2 + 2nP')^2 - 4(t^2 + n)\, n(P')^2}}{(t^2 - n)} .$$

where t is the value of the t statistic at either the .05 or .01 level of significance, 2 is the number of coders, n is the total number of units coded and P' is the obtained proportion of agreement between two coders.

APPENDIX D.--ANDERSON & GOODMAN'S LIKELIHOOD STATISTIC

Anderson and Goodman (1957) derive the following likehood statistic to compare an individual transition matrix to a composite matrix to determine the degree of similarity between the two matrices. The maximum likelihood statistic has a chi-square distribution with df = N(N-1), where N is the number of row or columns of the matrices being compared.

$$-2 \log_e \left[\prod_{t,j} \left(\frac{\hat{P}_{ij}}{\hat{P}_{ij}(t)} \right)^{n_{ij}(t)} \right]$$

where P_{ij} is the probability of the ij transition in the composite matrix, $P_{ij}(t)$ is the probability of the ij transition in the individual matrix t, and $n_{ij}(t)$ is the frequency of the ij transition in the individual matrix t.

For each ij, then,

$$-2 \sum_{t,j} \left\{ n_{ij}(t) \left[\log_e(\hat{P}_{ij}) - \log_e(\hat{P}_{ij}(t)) \right] \right\}.$$